DOCUMENT RESUME

ED 391 362 FL 023 510

AUTHOR Kidd, Richard; Marquardson, Brenda
TITLE Secondary Sourcebook for Integrating ESL and Content Instruction Using the Foresee Approach.
INSTITUTION Manitoba Dept. of Education and Training, Winnipeg.
REPORT NO ISBN-0-7711-1222-X
PUB DATE 94
NOTE 321p.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01/PC13 Plus Postage.
DESCRIPTORS Class Activities; Classroom Techniques; *Curriculum Development; Curriculum Guides; Educational Strategies; *English (Second Language); Foreign Countries; *Instructional Materials; *Interdisciplinary Approach; Lesson Plans; Media Selection; Models; Secondary Education; Second Language Instruction; *Second Languages; Teaching Guides
IDENTIFIERS *Content Area Teaching; *Foresee Approach

ABSTRACT

This manual presents the Foresee Approach for teaching English-as-a-Second-Language (ESL) at the secondary school level in Manitoba, Canada. The name refers to four C's: Communication; Cognitive-academic language development; and Content instruction in the Classroom. An introductory chapter offers background information on purpose and rationale of the guide, discusses the foundations of the approach in language acquisition, psychological, and educational theory, and explains the theoretical model for the Foresee Approach and some elements of its implementation. The second chapter addresses the selection of instructional materials, and the third discusses the development of lessons and units, with some attention given to classroom presentation techniques. Chapter 4 contains a sample 16-lesson unit on weather. The fifth chapter suggests general procedures and specific activities for implementing the approach in the secondary school regular classroom. (MSE)

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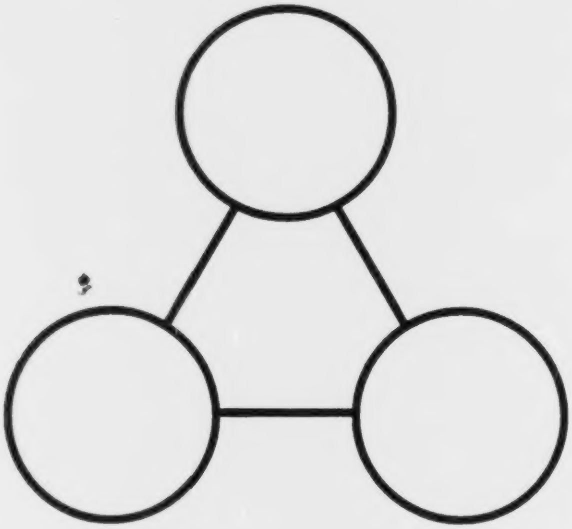

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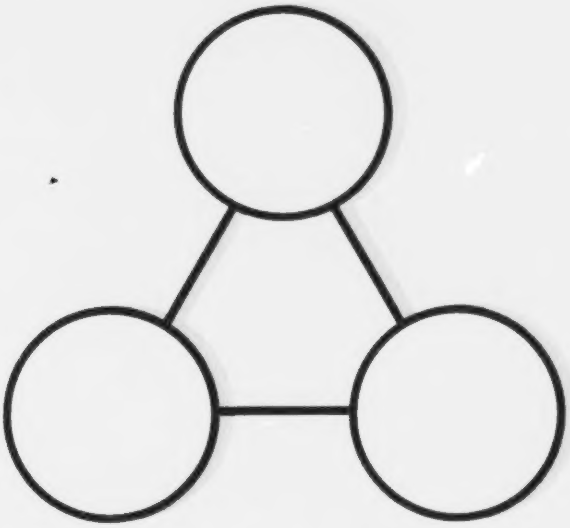

Curriculum Support Document

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ISBN 0-7711-1222-X

SECONDARY SOURCEBOOK

For Integrating ESL and Content Instruction Using the Foresee Approach

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1994

Foreword

This *Secondary Sourcebook* is a sequel to our *Sourcebook for Integrating ESL and Content Instruction Using the Foresee Approach*, originally published in 1993 and subsequently issued in a revised edition (1994). The goal in that first manual was to make our Foresee Approach accessible to all teachers of ESL students in Manitoba, at both the elementary and secondary levels and in both ESL and regular subject-area classrooms. The sample lessons and units we chose to include there were decidedly oriented towards the instruction of elementary ESL pullout classes. Despite this focus, however, we were optimistic that these examples would illustrate the essential principles and procedures of Foresee clearly enough that teachers at the secondary level could easily extrapolate from them in adapting our approach to their own teaching situations. Unfortunately, this proved not to be the case. Secondary ESL teachers were understandably reluctant to spend their valuable time studying units about forest animals or the Little Red Hen, and it quickly became evident that there would be little hope of expanding the use of Foresee to a wider audience unless we supplemented our initial examples of Foresee application with illustrative material more suited to the abilities and interests of older children. The result of that realization is this *Secondary Sourcebook*, which focuses specifically upon the use of Foresee at the secondary level, i.e., grades 7 to senior 4 (grade 12).

Fortunately, it was not necessary to rewrite the whole of our previous manual. The basic principles and procedures of our approach are the same at any level, and there was no point in writing brand new chapters describing the Foresee theoretical model and the Foresee application process. These were explained quite satisfactorily, in general terms, in the first three chapters of the original *Sourcebook*, so we have included these chapters — with minor revisions — as the introductory chapters of this secondary version. (As in our first manual, we emphasize that a thorough understanding of these chapters is a necessary prerequisite to putting our approach into practice.) These "generic" chapters, as we might call them, are then followed by two new chapters illustrating the application of Foresee at the secondary level.

Chapter 4, by far the longer of the two, is a sample unit on the topic of weather consisting of sixteen sequenced lesson plans. Its purpose is to show how Foresee lessons and units can be constructed for use in "all-ESL" classrooms (i.e., ESL preparatory or pullout classes) at the secondary level. Despite this focus, which will inevitably lead many readers to assume that the chapter is of interest only to ESL specialist teachers, we emphasize that the sample lessons it contains are relevant information for *anyone* wishing to learn our approach. All of the general principles and procedures of Foresee which were introduced in general terms in Chapters 1-3 are "brought to life" in this series of sample lessons, and although it is unlikely that many teachers — ESL or mainstream — will wish to read this extremely long chapter from start to finish, a careful scrutiny of selected lessons will prove invaluable as a guide to the practical application of our approach.

The subsequent chapter, Chapter 5, has a different aim and a different format. Its purpose is to suggest some ways in which the principles and procedures of Foresee can be integrated into regular subject-area classroom instruction. In place of sample lessons, this chapter presents a series of ideas for modifying mainstream content lessons along Foresee lines, with the goal of making the material easier for ESL students to comprehend and remember. Although it is addressed to regular classroom teachers, it should also prove valuable to ESL teachers wishing to assist their mainstream colleagues in incorporating Foresee methods into their instructional repertoires.

We hope, then, that this *Secondary Sourcebook* fills a rather obvious gap, and we encourage secondary-level teachers to experiment with the Foresee Approach as a means of meeting the needs of their ESL students and, indeed, any other students having difficulty with academic English.

Richard Kidd
Brenda Marquardson

Credits

We would like to thank the following publishers for their cooperation in allowing us to make use of the reading passages and visuals listed below.

1) **Santillana Publishing Company.**

Bridge to communication, Middle Level C, Teacher's Guide.

- Reading passage on the water cycle, 216 — adapted for use as part of our water cycle passage on 122.
- Reading passage on clouds, 220 — adapted for use as part of our clouds passage on 153.
- Temperature experiment, 214 — adapted for use as our temperature experiment on 111.

Bridge to communication, Middle Level C, Student Language Book.

- Focus Sheet 9.2a — water cycle diagram excerpted for use on 121.
- Focus Sheet 9.4 — wind diagram excerpted for use on 203.

2) **Stoddart Publishing Company.**

Farndon, J. (1992). *Eyewitness explorers weather.*

- "Make a barometer" experiment, 31 — adapted for use as our barometer experiment on 214.
- "Test for acid rain" experiment, 53 — adapted for use as our acid rain experiment on 220.

3) **The Learning Works, Inc.**

Weather, electricity, environmental investigations. (1982).

- Hygrometer experiment, 26-27 — adapted for use as our hygrometer experiment on 175.
- Relative humidity chart used on 176-177.

4) **D.C. Heath Canada Ltd.**

Bilyk, T. (1993). *Let's find out: Exploring science in the world around you.*

- Reading passage on forms of precipitation, 228-231 — adapted for use as our precipitation passage on 182.
- Reading passage on clouds, 227 — adapted for use as part of our clouds passage on 153.

5) **Oxford University Press.**

Brauer, J. Z. (1985). *Ernie and Bert's red book.* Open Sesame ESL Series.

- Reading passage on the water cycle, 51 — adapted for use as part of our water cycle passage on 122.

6) ***Winnipeg Free Press*** and **Weather Technical Services, Winnipeg, MB.**

- "The Weather," Dec. 19-24, 1993 — used as our weather visuals on 91.
- "Today's Weather," Dec. 21 and 22, 1993 — used as our weather visuals on 255 and 258 respectively.

We would also like to thank:

1) **Anna Uhl Chamot and J. Michael O'Malley** for:

- Three colour-coded learning strategies sheets
- List of learning strategies from:
  Chamot, A. U., and J. M. O'Malley. "The Cognitive Academic Language Learning Approach: A Bridge to the Mainstream." *TESOL Quarterly* 21.2 (1987): 227-249.

2) **Gail Kirsch**, whose desktop publishing skills were of great value in helping to prepare many of the diagrams in this manual.

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Chapter 1

Background Information

Chapter 1

Background Information

Preliminary Note from the Authors:

We want to begin by stressing to you that *the ideas in this introductory chapter are very important.* We hope you read this background information carefully and thoroughly, because the practical examples and teaching suggestions in subsequent chapters can't really be understood without it (especially the information on the Foresee theoretical model).

One other thing. You won't get very far in this chapter without noticing that almost everything is organized in groups of threes. This pattern began as a coincidence and ended up as a deliberate decision on our part. We like the arrangement because it imposes an orderly structure on the discussion, and also — more significantly — because it may help you better to remember some of the ideas below.

1. Introduction: Purpose, Rationale, and Preview

1.1 Purpose

The purpose of this manual is to show teachers a new and effective integrated approach for instructing the ESL students in their classrooms. We call it the **Foresee Approach**. The term "Foresee" derives from the homophone **"4C,"** which stands for Communication, Cognitive-Academic Language Development, and Content Instruction in the Classroom. We are firmly convinced that teachers who adopt this approach as the basis of their instructional planning should be able to foresee great improvements in the abilities of their ESL students to learn academic English and master content-area work.

The Foresee Approach can be used by teachers of two types.

a) **ESL specialist teachers** dealing with "all-ESL" classes or groups of students. Since the teacher's main objective in such situations is usually to teach language by using content-area work as the vehicle of instruction, this scenario is called **content-based LANGUAGE instruction** (Short, Crandall, & Christian, 1989).

b) **Regular classroom teachers** whose classes contain ESL students, whether in small or large proportions. The teacher's main goal in such situations is usually to teach content. If he or she recognizes the value of teaching language through the content-area work, however, and makes special efforts to help ESL students overcome their language difficulties, such instruction is called **language-sensitive CONTENT instruction** (Ibid.).

More than half of this manual is devoted to the description of one sample instructional unit, a unit on weather (Chapter 4) containing sixteen separate lesson plans. The purpose of this unit, which is intended primarily for an ESL "pullout" class at the secondary level (grades 7-12, or 7-senior 4 in the new course numbering system), is to *demonstrate* the general approach we are advocating. There is no reason why the lessons it contains could not be taught directly ("as is") by interested teachers, and in fact we recommend that teachers new to the Foresee Approach make a point of following our lesson plans rather closely as a way of becoming familiar with our techniques. The weather is just one content-area topic among many, however, and we emphasize that our goal is not to provide an instructional "cookbook" full of recipes that teachers can follow "to the letter." Rather, we aim to introduce teachers to a new way of thinking, a general approach to instruction that will empower them to create *their own* exciting, effective lessons and units for promoting the cognitive and language development of their secondary ESL students. (And as a bonus, it should be noted, many of the procedures in these lessons and units can be of great benefit to English-speaking students as well!)

The new approach we shall describe and illustrate is not intended to replace other time-tested methods and techniques for teaching academic language skills to ESL students. We recognize, for example, the value of the Language Experience Approach (LEA) for teaching reading, and the effectiveness of the process approach for teaching writing skills. We will have little to say about these and other useful methods, however, as they are adequately explained in many other publications. The Foresee Approach is meant to be a *supplement* to them, and should be regarded as an "additive" rather than a "subtractive" model of instruction.

One last point: this edition of our Foresee manual is intended specifically for teachers at the secondary level. The illustrative unit on the weather, as well as a subsequent chapter discussing the application of Foresee techniques in the regular classroom, are concerned with the instruction of ESL students in grades 7-senior 4. Teachers of ESL students in grades K-6 could certainly learn about our approach by reading this manual, but they would be better advised to consult our *Sourcebook for Integrating ESL and Content Instruction Using the Foresee Approach* (1993; rev. ed., 1994), which is oriented towards the elementary level.

1.2 Rationale

Experienced teachers may wonder why we wish to introduce yet another approach for teaching ESL, when so many methods and procedures (not to mention materials) are already available. The justification for a new approach lies in a radical shift of focus that has occurred in ESL instruction during the last six or seven years. To set the stage for an explanation of this shift, we begin by presenting a brief summary of some earlier trends in TESL (teaching English as a second language) methodology.

Prior to the mid-1970s or so, ESL tended to be taught mainly through structure-focused methods like grammar-translation and audiolingualism. Although these methods varied in focus, they all aimed primarily at equipping students with knowledge of the **forms** of language — pronunciation, grammar, vocabulary, and so forth.

In the late 1970s and early 1980s, however, modern "communicative" approaches to teaching ESL (and other languages) began to supersede the older form-focused methods. Briefly, these newer methods emphasized the acquisition of **communicative competence**. In schools containing sufficient numbers of non-English-speaking students, special ESL classes were set up to promote such acquisition. The goal of what came to be called **communicative language teaching** (CLT) was to develop the functional language proficiency of ESL students through the use of naturalistic, communication-oriented methods and techniques. Putting this more simply, the aim was to teach students the kind of English they would need in order to get along in everyday social situations. The emphasis of instruction consequently shifted away from language "form" (especially grammar) and towards such matters as language appropriateness ("sociolinguistic competence"), the rules of discourse ("discourse competence"), and — more generally — the ability to use language to perform important social functions like greeting, apologizing, agreeing and disagreeing, accepting or refusing invitations, asking for information, etc. After ESL students had experienced enough of this sort of instruction to be able to speak and understand the language of everyday communication, they were considered ready to exit their isolated ESL classes and enter mainstream programs. There, it was assumed, they could progress smoothly into the next stage, learning the conventions of "academic" English and developing the necessary language and literacy skills to succeed in content-area work.

Unfortunately, this scheme didn't work very well. It turned out that the acquisition of communicative competence was no guarantee of success in regular coursework. The main reason for this, as the research of Jim Cummins made clear in the early 1980s (see Section 2.2.2), was that there are significant differences between everyday conversational language and the language used in academic work. The English that ESL students had learned in order to perform "communicative" functions like greeting, apologizing, and accepting invitations was not of much use when it came to reading content-area textbooks or writing essays in mainstream courses. Some of the major differences between "communicative English" and "academic English" will be explained later in this chapter, especially in Section 2.2.2. For the moment, let us be satisfied with the observation that the task of teaching ESL must include an instructional component devoted to academic language. And since academic language obviously can't be taught in a vacuum, a movement began during the mid-1980s towards teaching English through content-area subjects — science, social studies, mathematics, and so forth. This general approach is usually referred to as **integrating language and content instruction**. For good reviews of the topic, see Spanos (1990) and Snow (1991). More detailed but individualistic treatments can be found in Mohan (1986), Crandall (1987), Cantoni-Harvey (1987), Short, Crandall, & Christian (1989), and Brinton, Snow, & Wesche (1989).

How did this shift of focus transform the existing pattern of ESL instruction, described above? Although the details of implementation varied from school to school, new and revised ESL programs began to feature some degree of *academic* language training as a supplement to communicative language training. This trend continues to the present. For example, in schools containing enough ESL students to make separate ESL classes feasible, especially at the secondary level, the instructional sequence often looks something like this:

Stage 1. Preparatory ESL instruction — isolated beginner-level ESL classes concentrating on communicative language training.

Stage 2. Transition or "bridge" courses — special ESL classes designed to prepare intermediate and advanced-level ESL students for mainstream coursework; focus on academic language training.

Stage 3. Mainstream courses (science, social studies, mathematics, language arts, etc.)

In secondary schools which contain too few ESL students to form separate ESL classes, and in most elementary schools, the *pullout model* is generally used instead. ESL students are assigned to regular classes from the outset, even though they may speak no English at all. ESL resource or "support" teachers then "pull out" single students or small groups of students for a certain amount of time per day, with the goal of teaching them (a) communicative English, and subsequently (b) academic English. While such special training is important, it goes without saying that these children should receive as much help and encouragement as possible in learning English within the regular classroom setting as well.

The modern trend described above places new demands on teachers. ESL teachers who have previously developed expertise in teaching communicative language skills must now add to their repertoires a set of effective methods and techniques for teaching academic language as well. Regular classroom teachers must recognize their responsibility for promoting their ESL students' academic language growth, and must learn productive ways of accomplishing this goal. This manual was written to meet these needs. The Foresee Approach provides a model that both ESL and mainstream teachers can use to plan appropriate instruction for developing their ESL students' academic language proficiency.

1.3 Preview

This first chapter is intended as an introduction to the Foresee Approach, and focuses mainly on theoretical concerns. Section 2 reviews some important theoretical (and also, in some cases, practical) developments in a variety of fields, all of which combine to provide our approach with a solid foundation. Section 3 presents a detailed summary of the **Foresee theoretical model**. This model, which is based largely on the Cognitive Academic Language Learning Approach (CALLA) invented by Chamot and O'Malley (1986, 1987, 1989, 1994), is indispensable to the planning of lesson objectives, as we shall see.

Following Chapter 1, the focus of this manual shifts to more practical matters, and subsequent chapters all deal in some way or other with the **application** of the Foresee Approach in real classrooms. Chapter 2 discusses the importance of good **materials** in developing effective Foresee lessons and units. Chapter 3 provides some specific guidelines for **planning** these lessons and units, and also outlines some effective **techniques** that can be exploited for this purpose. Chapter 4 contains an extremely detailed and thorough description of a complete Foresee unit on the topic of weather. This unit illustrates all the basic principles and procedures of the Foresee Approach, and although it is designed specifically for teachers of ESL pullout or preparatory classes ("all ESL" classes, in other words), mainstream teachers will also find it a valuable guide to learning our approach. Finally, Chapter 5 presents a number of ideas for applying Foresee principles and implementing various Foresee techniques in mainstream content-area classrooms. Contrasting Chapters 4 and 5 in terms of the context distinction defined on page 1, Chapter 4 deals with **content-based language instruction** whereas Chapter 5 is concerned with **language-sensitive content instruction**.

2. Foundations: Language Acquisition, Psychology, and Education

2.1 Overview

The general movement towards integrating language and content has been pushed forward by theoretical and practical developments in a number of diverse fields. Some of the most important of these developments or "foundations" are briefly discussed in this section, one by one. Their significance to the Foresee Approach will be noted at the end of each subsection.

The developments selected for consideration fall into three categories, represented by the circles in Fig. 1.1. Each circle contains three subcategories, giving a total of nine underlying foundations.

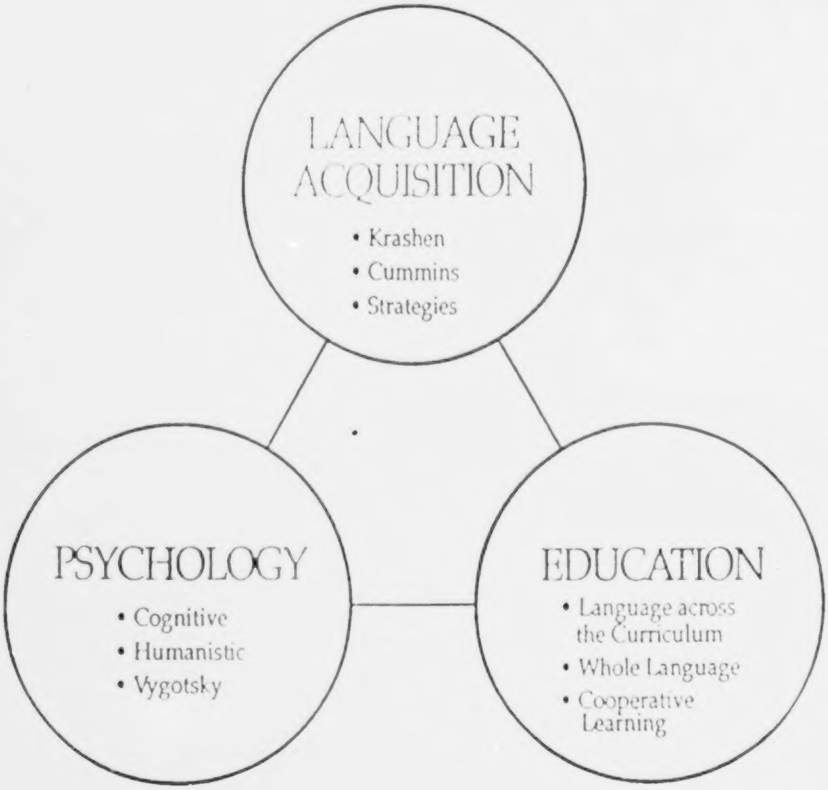
LANGUAGE ACQUISITION
• Krashen
• Cummins
• Strategies
PSYCHOLOGY
• Cognitive
• Humanistic
• Vygotsky
EDUCATION
• Language across the Curriculum
• Whole Language
• Cooperative Learning

Fig. 1.1: Foundations of Integrated Instruction

2.2 Language Acquisition Foundations

2.2.1 Krashen

The language acquisition theory of **Stephen Krashen** (1982) has had an enormous influence on second language teaching practices over the past dozen years or so. Krashen's theory itself pertains mainly to the acquisition of the "linguistic rules" of a language (sentence structures, verb tenses, etc.). Nevertheless, his theory encourages a particular methodological orientation which has major consequences for both communicative language teaching (CLT) and integrated language and content instruction.

Krashen argues that there are two distinct ways of gaining knowledge of a language, *acquisition* and *learning*. **Acquisition** is the process of internalizing the vocabulary and rules of a language subconsciously, without apparent effort, the way young children pick up their first language (L1). **Learning** is the planned, conscious study of language, usually involving a great deal of memorization and deliberate practice. The latter is, of course, the route typically followed by adult learners of a second language (L2). Acquired language rules are subconscious and implicit ("in your head"), whereas learned rules are conscious, explicit, and mentally accessible for analysis and description. Krashen claims that acquisition and learning are two completely *separate* processes, and that learning can never result in acquisition. The main value of learned rules, he insists, is that they can serve a "monitor" function, providing L2 speakers with conscious knowledge that they can use for editing or correcting utterances. Acquired linguistic knowledge, such as the rules of our L1, cannot result from "learning" in Krashen's sense, or so he claims.

How, then, *does* it result? How can students "acquire" a second language? According to Krashen, L2 acquisition closely resembles L1 acquisition. Despite the popular opinion that the ability to acquire languages in a natural way declines after childhood, older learners can actually "pick up" language as children do. That is, they can make subconscious use of their innately-endowed "language acquisition device" (LAD) to acquire the rules of a language, and this process can be automatic and relatively effortless. All that it requires, Krashen maintains, is a rich, appropriate, and plentiful supply of **comprehensible input**. If learners are exposed to a sufficient quantity of linguistic messages that they can *understand*, and if they focus on the *meaning* (not the *form*) of those messages, and if they have a *positive attitude and motivation* towards receiving the messages, then *acquisition will inevitably occur*. The LAD functions automatically, allowing learners to acquire the rules and structures of the L2 in a definite sequence or "natural order." In a nutshell, this is Krashen's theory of L2 acquisition.

Its instructional implications are straightforward. The proper way to teach a second language, Krashen argues, is to provide students with a plentiful supply of good comprehensible input in a comfortable, motivating learning environment. If this is accomplished successfully, acquisition will take care of itself — effortlessly, automatically, and naturally. This sounds too good to be true. The trick, of course, is for the teacher to provide the right input. One of the keys to doing this effectively is to give students plenty of contextual clues to meaning — pictures, physical objects, body language, etc. This strategy is the basis of Krashen and Terrell's (1983) **Natural Approach** for teaching second languages. It is easy to see why the main procedures of this approach — and Krashen's ideas more generally — have had such an impact on communicative language teaching. No longer do L2 teachers consider it imperative or even advisable to encourage the formal, conscious study and learning of vocabulary and grammar. Acquisition is now regarded by many as the proper route to communicative competence, and instruction tends to reflect this priority.

Krashen's theory is also cited, quite often, in support of the practice of integrating language and content, mainly on the grounds that the various content areas are a rich and almost limitless source of interesting and motivating comprehensible input. This is certainly true, and we recommend that both ESL and mainstream teachers take advantage of the potential of content-area work to promote language acquisition. Nevertheless, we caution strongly against the supposition that the conventions, rules, and skills of academic language can be automatically "acquired" in the way that Krashen suggests. Teachers should not assume that ESL students will somehow absorb academic language through mere exposure to it. Young children, after all, acquire most of the structures of their L1 before beginning school, but they still have to *learn* how to read and write. In our opinion, many of the facts and skills of academic language have to be learned (on a conscious level) by L2 students as well. While the Foresee Approach encourages acquisition-oriented activities in the classroom, then, it also insists on the need for deliberate, planned instruction of a number of important aspects of language and, obviously, content as well. We shall return to this issue below.

2.2.2 Cummins

Probably no single researcher has had more of an influence on the movement towards integrated instruction than Jim Cummins. His first major contribution (1979) was his suggestion that there were important differences between **basic interpersonal communicative skills** (BICS) and **cognitive/academic language proficiency** (CALP), a distinction already alluded to above. When he coined these terms, the emphasis of ESL instruction was primarily on BICS, what we have called "communicative competence." The idea that CALP entails a different sort of competence was really the starting point of the current trend towards integrating language and content. Unfortunately, Cummins did not initially define the differences between BICS and CALP in any substantive way, and the two terms aroused a good deal of controversy in the literature. He subsequently abandoned them in favor of a more rigorous way of characterizing the difference between communicative and academic language proficiency.

This newer scheme (Cummins, 1983) contrasted the two kinds of proficiency in terms of two independent criteria, *cognitive demand* and *context embeddedness*. A first and rather obvious difference between communicative and academic language tasks is that the latter are more difficult, more mentally challenging. Delivering a formal speech or writing an academic essay, for example, are far more **cognitively demanding** than chatting with friends during coffee break or writing a friendly letter.

The second difference concerns the degree to which language is supported by contextual information of various sorts. Conversational language tasks are generally easy to perform because they are **context embedded** — that is, speakers or listeners can make use of many cues *besides language* in producing and interpreting messages. These include stress and intonation patterns in speech, gestures, facial expressions, and visual supports of various kinds (the physical surroundings, objects that both speaker and listener can see and touch, sometimes pictures or diagrams, etc.). Another attribute of contextual support is the frequent opportunity of negotiating meaning as a conversation progresses: the participants can repeat themselves, rephrase their thoughts, ask for clarification, exercise control over the topic under discussion, and so forth. In contrast, these various contextual supports are far less common in academic language, which tends to be **context reduced**. Needless to say, language tasks are more difficult for students when extra-linguistic cues are unavailable and meanings are encoded exclusively in the words themselves.

Since cognitive demand and context embeddedness are independent criteria, language task difficulty can vary along two dimensions, as shown in Fig. 1.2 (Cummins, 1983). The language of everyday communication is cognitively undemanding and context embedded, so

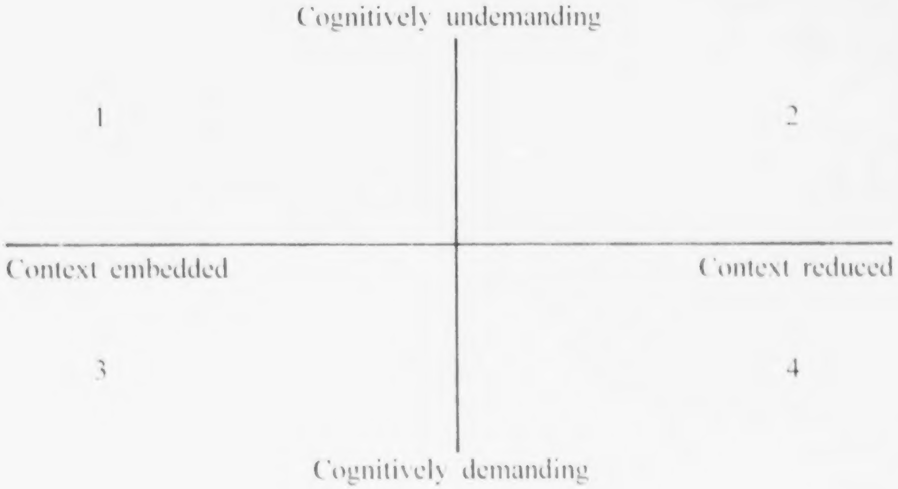

Fig. 1.2: Two Dimensions of Language Proficiency

Cummins's "BICS" falls into quadrant 1. Academic language tends to be the opposite, cognitively demanding and context reduced, and thus lies in quadrant 4.

Considering all this from an instructional perspective, the first thing that should be obvious is that leaping directly from quadrant 1 to quadrant 4 will surely be difficult for most ESL students. This explains why the former scheme of teaching BICS first, CALP second is ineffective. The preferred alternative is to lead students through transitional stages along the way to academic proficiency. Such stages are represented by quadrants 2 and 3 in the diagram. In quadrant 2, language tasks are context reduced but within students' abilities because they are cognitively undemanding. A good example would be the writing of a friendly letter. In quadrant 3, the potential domain of much successful content-area instruction, difficult material is made comprehensible via deliberate, carefully planned contextual support — pictures, diagrams, realia, videotapes, etc. At this point Cummins's theory intersects with Krashen's, both emphasizing the value of context in making input comprehensible. The Foresee Approach operates mainly in the realm of quadrant 3.

2.2.3 Strategies

The middle and late 1970s witnessed a sudden growth of interest in **language learning strategies**. Researchers were motivated by the conviction that "good language learners" were able to acquire second languages successfully because they knew how to make use of effective strategies for memorizing L2 items, analyzing and making sense of the structures of the L2, creating opportunities for worthwhile practice, etc. The thrust of research was to discover, through observation, student introspection, and a variety of other methods, just what these effective strategies were, and to classify them. Rubin (1975, 1981) identified a relatively small number of useful strategies, including monitoring (of self and others' speech), systematic memorization, and inductive inferencing (guessing meanings from context). Naiman *et al.* (1978) listed five major categories of good L2 learning strategies, namely (1) taking a positive, active approach to the task, (2) approaching the L2 as a system and constantly analyzing that system, (3) using language for communicative purposes, (4) coping with the affective demands of L2 learning, and (5) constantly monitoring one's L2 performance.

This interest in strategies continued into the 1980s with the work of Oxford (e.g., 1985, 1990). Her classification scheme is the most complex of all, as she distinguishes between "direct" strategies (3 types — *memory*, *cognitive*, and *compensation*) and "indirect" strategies (3 types — *metacognitive*, *affective*, and *social*). These 6 main categories include 19 subcategories in all, which in turn encompass a total of 62 specific learning strategies. One of the notable merits of Oxford's (1990) detailed book on the topic is that it presents a wide variety of useful exercises and activities for teaching these many strategies to L2 students.

This interest in language learning strategies was paralleled by a growing interest in the nature and function of cognitive strategies for learning in general (e.g., Weinstein & Mayer, 1986; Weinstein, 1988; Mayer, 1988). Researchers have made considerable progress in discovering and classifying a variety of mental strategies which students can learn to apply to their learning tasks in order to accelerate the acquisition of academic knowledge and skills. The need for shifting emphasis from the "what" of learning (i.e., the subject area content) to the "how" is eloquently expressed in the following passage from Norman (1980).

> It is strange that we expect students to learn yet seldom teach them about learning. We expect students to solve problems yet seldom teach them about problem solving. And, similarly, we sometimes require students to remember a considerable body of material yet seldom teach them the art of memory. It is time we made up for this lack, time that we developed the applied disciplines of learning and problem solving and memory. We need to develop the general

> principles of how to learn, how to remember, how to solve problems, and then to develop applied courses, and then to establish the place of these methods in an academic curriculum. (p. 97)

For a thorough and easily accessible review of the research in the teaching of learning strategies, the reader is advised to consult Weinstein and Mayer (1986).

Chamot and O'Malley (1986, 1987, 1989; O'Malley & Chamot, 1990) have drawn heavily upon research in both types of learning stategies (language and general cognitive) in formulating their Cognitive Academic Language Learning Approach (CALLA). We shall postpone our discussion of their classification scheme until Section 3.3.3. The CALLA model of integrated instruction is the main foundation of the Foresee Approach, and its **learning strategies component** will therefore be examined in considerable depth.

2.3 Psychological Foundations

2.3.1 Cognitive Psychology

Modern L2 teaching practices, whether communication- or content-oriented, have been heavily influenced by the principles of **cognitive psychology** (e.g., Ausubel, 1968; Anderson, 1985; see Chastain, 1976, for an excellent discussion). Although an extensive review of this topic is impossible here, we shall briefly mention three cognitive principles that have special significance for integrated instruction.

First, learners are *active* processors of information. Little credibility now resides in the behavioristic view that students should be treated as passive receptacles into which knowledge can be poured little by little, with learning resulting as a conditioning process. Modern integrated L2 teaching emphasizes the learner's active involvement with the material to be assimilated, both the language and the content. Activities like drill, mechanical practice (written or oral), and rote memorization are to be avoided in the classroom in favor of more stimulating and creative learning tasks. As mentioned above, an important focus of academic instruction should be the development of appropriate **learning strategies**, i.e., mental processes for facilitating the acquisition of knowledge and skills. The Foresee Approach, like CALLA, emphasizes the instruction of such strategies.

Second, learning is facilitated — indeed, is only possible — when students are able to fit the new information they encounter into their *existing knowledge frameworks*. Good teachers therefore make special efforts to activate learners' background knowledge ("schemata," plural of "schema") as a first step in introducing any topic. Lesson design in both the Foresee Approach and CALLA includes a **preparation phase** which is intended for this purpose.

Third, there are two basic avenues to understanding written or spoken language. Comprehending new material by bringing to bear one's prior knowledge is known as "*top-down*" processing, while comprehension based on the careful decoding of linguistic messages (vocabulary, structures, and style) is called "*bottom-up*" processing (Carrell, 1983). Good teaching methods, such as those promoted by the Foresee Approach, activate both avenues to understanding. Both are important.

2.3.2 Humanistic Psychology

Little space needs to be devoted to this topic, since its basic ideas are relatively obvious. As emphasized in the work of psychologists like Carl Rogers (1956) and Abraham Maslow (1971), and also in the writings of language teaching practitioners like Gertrude Moskowitz (1978), instruction is most effective when it appeals to, and satisfies, the emotional (affective) needs of learners. Moskowitz expresses this view very poignantly:

> Affective education is effective education. It works on increasing skills in developing and maintaining good relationships, showing concern and support for others, and receiving these as well. It is a special type of interaction in itself, consisting of sharing, caring, acceptance, and sensitivity. It facilitates understanding, genuineness, rapport, and interdependence. Humanistic education is a way of relating that emphasizes self-discovery, introspection, self-esteem, and getting in touch with the strengths and positive qualities of ourselves and others. (p. 14)

The result of such education will be *self-actualization*, and

> since self-actualization is such a powerful inherent need in humans, as students see the subject matter as self-enhancing, it will be viewed as relevantly related to their lives. They will then become more motivated to learn . . . (p. 13).

Although integrated instruction does not normally include the sorts of humanistic language-learning activities advocated by Moskowitz (1978), the Foresee Approach certainly promotes all of these values. We believe that teachers should never underestimate the learning potential of children. Given instruction, encouragement, and guidance that enhances their sense of self-worth, they are capable of amazing achievements. Perhaps the greatest strength of the Foresee Approach is that it equips the teacher with a way of *setting the students up for success*.

We have found that when this is accomplished, the students are motivated and success almost invariably tends to follow.

2.3.3 Vygotsky

The great Russian psychologist **L.S. Vygotsky** died in 1934, but his ideas about cognition and learning have recently begun to gain the influence they deserve. We shall outline two of his central concepts, attempting briefly to relate them to the theory and practice of integrated instruction.

One of Vygotsky's major insights about learning was that "mental functioning occurs first between people in social interaction and then within the child on the psychological plane" (Rogoff & Wertsch, 1984). Thinking, reasoning, and problem solving are initially carried out on the *interpsychological* plane, as collaborative endeavors involving several participants (e.g., parent and child, teacher and child). This becomes the basis for these processes to be internalized by the child, at which point they become integrated into (and in fact help create) the *intrapsychological* plane.

Vygotsky's second key concept relates to the dynamics of this developmental process, specifically, how individuals proceed from lower stages of psychological functioning to higher stages. To explain this, Vygotsky proposed a construct which he called the **zone of proximal development** (ZPD). He argued that it is simplistic to define children's developmental levels only in terms of what they can do on their own (as, for example, on written intelligence tests). Any child can reasonably be regarded as having two levels of development:

a) the level of individual, independent functioning, i.e., the level of *actual development*; and

b) the level at which the child can function "while participating in instructional social interaction" (Rogoff & Wertsch, 1984), i.e., the level of *potential development*.

Vygotsky defined the zone of proximal development as

> the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined by problem solving under adult guidance or in collaboration with more capable peers (Vygotsky, 1978).

In contrast to Piaget, who maintained that instruction should be appropriate to developmental stages that have already been completed, Vygotsky argued that

> instruction is good only when it proceeds ahead of development. It then awakens and rouses to life those functions which are in a stage of maturing, which lie in the zone of proximal development. It is in this way that instruction plays an extremely important role in development (Vygotsky, 1956).

Vygotsky's theory underlies a number of recent pedagogical notions. One of the best known is the concept of **scaffolding** (Wood, Bruner, & Ross, 1976). A teacher using this technique "monitors the child's current level of skill and supports or 'scaffolds' the child's extension of current skills and knowledge to a higher level of competence" (Rogoff & Gardener, 1984). A second related notion is Tharp and Gallimore's (1988) conception of teaching as **assisted performance**: "teaching can be said to occur when assistance is offered at points in the ZPD at which performance requires assistance" (p. 41).

We have placed considerable emphasis on Vygotsky's theories because we believe Tharp and Gallimore's definition of teaching to be a profoundly insightful one. ESL students have to be assisted through two different, though related, zones of proximal development: the language zone and the content zone. They will not find it easy to traverse either zone without expert guidance from the teacher, whose role in the classroom obviously transcends that of being a mere facilitator of interesting activities. Good teaching, we affirm, demands both skill at estimating each student's ZPD and expertise in providing instruction that will foster the internalization of social experiences. The Foresee Approach thus recognizes an important place for what Chamot and O'Malley (1989) call "teacher-directed" activities, which are essential if students are to receive proper assistance through their ZPDs. We shall return to this matter below in our discussion of the whole language approach (Section 2.4.2).

2.4 Educational Foundations

2.4.1 Language across the Curriculum

Like the other two modern movements to be discussed in this section, whole language and cooperative learning, the **language across the curriculum** movement is an approach for *first language* (L1) education that has been adapted for L2 instructional purposes. In fact, this movement is really the genesis of the current trend towards integrating language and content, its main tenet being — as the name suggests — the idea of teaching language skills through all the subjects in the curriculum.

The language across the curriculum movement was triggered originally by the Bullock Report in Great Britain, entitled *A Language for Life* (1975). One key observation of the

Bullock Commission was that a child, in growing from 0 to 5 years of age, (a) accomplishes an incredibly complex task in learning its L1, and (b) learns more about its environment than in any subsequent 5-year span. For the young child, personal, cognitive growth and language growth proceed in concert. Language is the "means" and personal growth is the "end," in the Report's terms. The two are "interlocking" from age 0 to 5. But this interlocking, the Report insists, should be continued when school begins, not replaced by an approach that fractures and separates language learning from content learning.

> What we advocate here is no more than that this interlocking of the means and the ends should be maintained ... throughout the years of schooling. To achieve this we must convince the teacher of history or of science, for example, that he (sic) has to understand the process by which his pupils take possession of the historical or scientific information that is offered them; and that such an understanding involves his paying attention to the part *language* plays in *learning*.

Obviously, this insight directly underlies and supports the current trend towards integrated L2 instruction, including the Foresee Approach.

A second important insight advanced in the Bullock Report was that each school subject (science, social studies, mathematics, etc.) entails its own special, unique variety of academic language.

> In general, a curriculum subject, philosophically speaking, is a distinctive mode of analysis. While many teachers recognize that their aim is to initiate a student in a particular mode of analysis, they rarely recognize the linguistic implications of doing so.

The Bullock Commission was mainly concerned about developing the abilities of students to handle the differing *first* language academic demands of various curriculum subjects. The need for such specialized language instruction is even more acute when students are attempting to cope with curricular demands in a *second* language. All teachers of ESL students, whether in ESL or mainstream classrooms, should be aware of the unique linguistic demands of each subject area that their students have to deal with. (See Gillham, 1986, for a number of insightful articles on this topic.) The Foresee Approach, as we shall see, provides explicit guidelines for identifying these special linguistic features and for teaching them through content-area work.

2.4.2 The Whole Language Approach

A second L1 teaching movement with obvious consequences for integrated ESL instruction is the **whole language approach**, which one supporter describes as no less than "a *philosophy*, a belief system about the nature of learning and how it can be fostered in classrooms and schools" (Weaver, 1990). The burgeoning popularity of this movement in recent years has been confined mainly to the elementary level, though whole language methods can certainly be applied at the secondary level as well (see, e.g., Gilles *et al.*, 1988).

While we lack the space here to present a thorough description of whole language, we believe the essence of the approach is captured in the following four principles.

a) Whole language instruction is **holistic**, featuring **integration** of all the language skills (listening, speaking, reading, and writing) as well as integration of language with content-area work.

b) Both oral and written language must be **functional** and **authentic** in the whole language classroom, fulfilling real purposes for language users, expressing personal meanings, etc.

c) Whole language instruction encourages considerable **student control** over the content of learning. To a large degree, the curriculum is "negotiated" with children, i.e., "it evolves as teachers and children together explore topics and themes, generating new interests and goals" (Weaver, 1990). Note, however, that whole language teachers are expected to ensure that the mandated curriculum is somehow incorporated into the "negotiated" one.

d) Learning activities in a whole language environment involve a great deal of interaction (student-student, student-teacher), collaboration, and communication. Weaver (1990) asserts that whole language instruction is based on a **transactional** model of learning, "reflecting the fact that the learner actively engages with — or transacts with — the external environment, including people and books, in order to learn."

We heartily endorse these principles, and recommend them as important guidelines for Foresee instruction. The first is, of course, at the heart of the Foresee Approach. As for the others, we agree with the proponents of whole language that learning is enhanced when language is used for real purposes, when students have some ownership over the curriculum, and when classroom activities are collaborative and "transactional."

Despite these obvious merits, however, we caution against the wholesale adoption of whole language as the *sole* basis of integrated ESL instruction. In our view, the whole language approach places too great a reliance on "inner-directed" learning. Advocates of whole language generally assume, and often state explicitly (e.g., Goodman & Goodman, 1990), that successful learning depends mainly on the *child's* contribution to the process — interest, motivation, personal sense of purpose, autonomy, creativity, and so forth. This assumption is implicit in Weaver's interpretation of "transaction" in principle (d) above. She views transaction as basically a one-way process, the child's active engagement with the external environment. There is no mention here of the environment's active engagement with the child. This betrays a general lack of interest — typical of the proponents of whole language — towards the organization of maximally effective environmental support. A simpler name for the latter is "good teaching."

In our opinion, good teaching means more than acting as a facilitator of children's learning and working to foster an atmosphere of independent inquiry, important though these responsibilities may be. Good teaching also involves the ability to assess what students know and are able to do on their own, to estimate what they could know and could do with proper pedagogical guidance, and to assist them to traverse the gap — this being, of course, Vygotsky's zone of proximal development. While much knowledge and many skills of language and content-area work can doubtless be "acquired" through experiential learning of the whole language variety, there are many things that students cannot learn efficiently and successfully without the teacher's help.

We realize that we can be accused of exaggeration here. Whole language teaching, its supporters will insist, does not exclude teacher-centred instruction; skilled whole language teachers are able to draw upon a wide repertoire of different instructional styles, teacher-centred ones included, to meet the varied needs of their students. This is true, no doubt, but unfortunately, not all teachers possess the necessary expertise to do this. We fear that the whole language environments of many students will turn out to be aimless and disorganized unless teachers are provided with clear-cut guidelines for incorporating appropriate teacher-centred instruction into their lessons. The Foresee Approach contains specific guidelines of this sort, allowing teachers a systematic way of effectively blending together what Chamot and O'Malley (1989) call "teacher-directed" and "learner-centred" instructional procedures.

2.4.3 Cooperative Learning

During the mid-1980s, increasing attention began to be paid to the instructional advantages of **cooperative learning** (e.g., Slavin, 1983; Johnson *et al.*, 1984; Kagan, 1985, 1986). Although most research on the topic has dealt with the English L1 (i.e., mainstream) context, Jacob and Mattson (1987) suggest that cooperative learning methods can also contribute to the academic development of ESL students. Obviously, such arrangements provide opportunities for a great deal of personal interaction among students. In mainstream classrooms, the increased communication between ESL and English-speaking students is likely to help the ESL students to improve their communicative competence (McGroarty, 1992). More significantly from our perspective, their *academic* language proficiency — especially their oral proficiency — is bound to be promoted by such communication, since a good deal of it will involve the performance of content-area tasks. Jacob and Mattson maintain that cooperative learning methods can be used with all ESL students and with any type of class:

> The methods are helpful with students from kindergarten through college at all levels of proficiency, in ESL pullout classes, sheltered English classes, or mainstream classes. Subjects can include English as a second language or content areas such as math, science, and social studies (1987).

Cooperative learning means more than putting students in small groups and having them work together. A number of different cooperative learning methods have been proposed in the literature on the topic. These differ from each other in a number of ways, including the aspects of development promoted, the type of cooperation required, student roles, and teacher roles. Perhaps the best known of these methods — at least among ESL teachers — is the **Jigsaw** technique, which has been adapted for L2 instructional purposes by Coelho (1988). Still, some of the other specific methods reviewed by Jacob and Mattson (1987) would also seem to have promise for the teaching of ESL students, though they might require a certain amount of modification. Kagan (1990) observes that cooperative learning methods, or **structures** as he calls them, are "content-free ways of organizing social interaction in the classroom." When utilized or applied for particular purposes in content-area lessons, structures give rise to specific *activities*. The advantage of knowing a variety of cooperative learning structures, such as those listed by Kagan (1990), is that they can be used to generate literally an unlimited number of classroom activities.

It is no exaggeration to say that cooperative learning of some kind should take place in *every* Foresee lesson. Oral academic language skills are not developed in silent isolation. They stand a good chance of growing, however, when ESL students collaborate with each other or with English-speaking peers to accomplish meaningful content-related tasks.

3. The Foresee Theoretical Model

3.1 CALLA, the Basis of the Foresee Approach

The **Cognitive Academic Language Learning Approach**, or **CALLA** (pronounced caLLA), is the invention of Anna Uhl Chamot and J. Michael O'Malley, two innovative American researchers and educational theorists. Their model is explained at length in a number of their writings, especially Chamot & O'Malley (1986, 1987, 1989, 1994) and O'Malley & Chamot (1990). Readers wishing to deepen their understanding of CALLA, especially the details of its theoretical foundations in cognitive psychology, are advised to consult some of these sources. Chamot and O'Malley's work has been our major inspiration, and we gratefully acknowledge our debt to their insights and achievements.

The Foresee Approach is a modified version, or more accurately an *extension*, of CALLA. Foresee and CALLA share the same purpose and resemble each other in many important respects. The differences between the two models exist on two levels, the **theoretical** level and the level of classroom **application**. Our innovations on the latter level are discussed at length in the next two chapters, especially Chapter 3. Most of the remainder of the present chapter will be devoted to a rather thorough description of what we call the **Foresee theoretical model**. This model is based directly on CALLA, though it incorporates a number of significant modifications. Perhaps the most obvious of these is our diagrammatic representation of the overall model and most of its subcomponents, in the form of the triangular configuration shown in Fig. 1.3 and in subsequent figures in this chapter.

Although the word "theoretical" may tempt some readers to skip the following pages, we must emphasize that a thorough understanding of this model is *absolutely essential* to an appreciation of the teaching techniques and sample lessons outlined in later chapters. Our objective here is to explain this important model in sufficient detail that the reader will be able to perceive its application in the practical examples to follow.

3.2 Introduction to the Model

Foresee, like CALLA, is a model of integrated instruction. Most other models of this type emphasize the integration of two domains of knowledge, content and language. CALLA goes beyond them in advocating the integration of *three* domains: content, language, and learning strategies. Foresee copies this scheme, and thus a typical CALLA lesson contains instruction relating to three components, as illustrated in Fig. 1.3 on the next page.

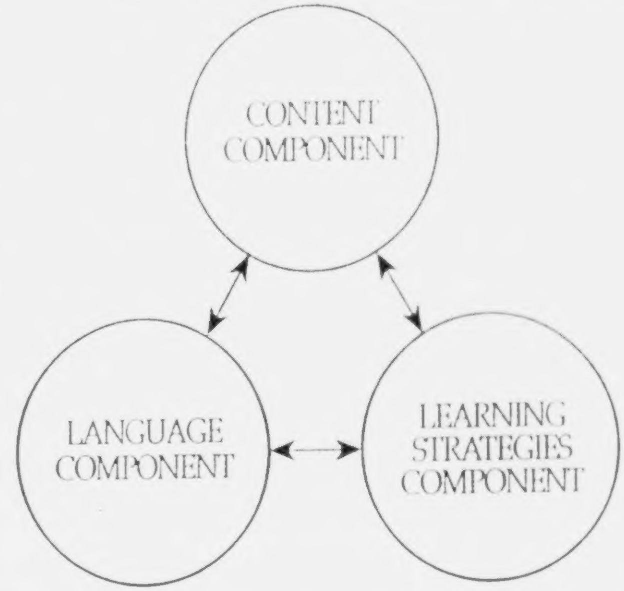

Fig. 1.3: 3 Components of the Foresee Theoretical Model

These three components are not taught separately, in isolation from each other. Rather, they interact with each other in reciprocal and mutually supportive ways, as indicated by the two-way arrows in Fig. 1.3. The two components at the bottom, language and learning strategies, serve as the "base" for the learning of content (subject matter). Conversely, the content material provides the vehicle through which academic language proficiency can be developed and the learning strategies can be learned and practised. In fact, it is fair to say that Foresee instruction is "content-driven," since the choice of content generally determines which aspects of language and which learning strategies will be taught; hence, the position of content at the top of the triangle is appropriate. As for the interaction between the two base components, well-chosen learning strategies can assist students to acquire language (knowledge and skills), while language skills are essential to the successful application of the learning strategies. As an example of the latter dependence, good listening skills are obviously important to effective notetaking, one of the cognitive strategies listed by Chamot and O'Malley (see Section 3.3.3).

Our next step in explicating the Foresee theoretical model will be to examine each of these three main components separately, one by one. Our interpretation of the model at this point is somewhat original, as we visualize each component as containing three subcomponents which can be represented by diagrams congruent to that in Fig. 1.3.

3.3 The Three Components of the Foresee Theoretical Model

3.3.1 The Content Component

The selection of content material to be taught depends on a number of factors, including the students' interests, the teacher's imagination, the curriculum, and the teaching context. Let us focus on the last of these. Obviously, specialist ESL teachers wishing to implement **content-based LANGUAGE instruction** have a good deal of latitude in selecting content topics for their classrooms, as they usually have no prescribed curriculum to follow. Although student interest is certainly a major criterion for deciding on what to teach in such a context, ESL teachers are advised to choose topics that will prepare their students for regular subject-area work when they finally encounter it. Active collaboration between ESL and mainstream teachers can lead to fruitful decisions in this regard (Short, Crandall, & Christian, 1989; Snow, Met, & Genesee, 1989).

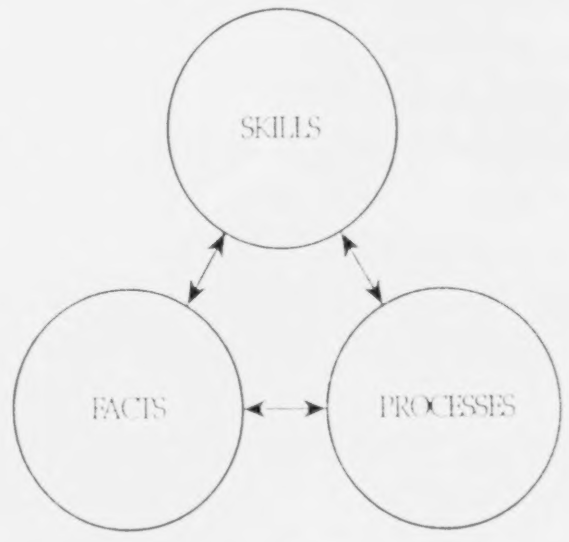

Fig. 1.4: The Content Component

Regular classroom teachers face a more difficult problem, that of communicating complex ideas to ESL students who are not yet fully prepared for content-area work. Chamot and O'Malley (1989) observe that mainstream teachers often react to the limited English proficiency of their ESL students by teaching content on an adjusted or simplified level, tolerating lower-order academic and cognitive skills in place of the more advanced skills they expect from their English L1 students. But as Chamot and O'Malley insist, this is a fundamental error. In their words, "ESL students need to learn content that is appropriate to their developmental level and prior educational experience, and higher-level thinking skills are as much to be expected from them as from any student" (1989: 114). Content-area teachers who must cope daily with ESL students from apparently poor academic backgrounds may protest that there seems little else they can do with these students but lower their expectations as a way of getting them through. This reaction is understandable; there is no question that many of our ESL students are lacking in some of the basic knowledge and skills essential for success in mainstream courses. Their previous educational experiences, for whatever reasons, have not equipped them adequately for our curricula. Nevertheless, content teachers should realize that watering down the subject matter and lowering expectations cannot solve the problem. Such measures simply postpone the day, if it ever comes, when these students catch up to their English-speaking peers in academic proficiency.

Turning directly to the internal composition of the content component, we suggest that content mastery generally involves knowledge of three sorts, as depicted in Fig. 1.4.

Facts are chunks of information about a given subject area, for example, names, dates, places, and events in history. **Processes** are relations or connections between entities or events, usually conceived as dynamic models. An example would be the water cycle in geography, which consists of a complex sequence of events. Both facts and processes, which we have placed at the base of the triangle in Fig. 1.4, are instances of what Anderson (1985) calls *declarative knowledge*, what we "know" about a given topic. The **skills** represented by the topmost circle are particular modes of analysis, reflection, activity, etc. which one learns through participation in individual subject areas. The most obvious examples of content-specific skills are those of mathematics — computational skills, algebraic skills, etc. Each subject area contains its own unique set of skills, although some — like problem-solving skills — obviously cross disciplines. Skills are instances of *procedural knowledge* (Anderson, 1985), that is, what we know how to *do* in a given subject.

We emphasize that these aspects of declarative and procedural knowledge are to be understood here as strictly *content-related*. Students learn the facts, processes, and skills of science, for instance, by studying and "doing" science. Obviously, however, language is crucial to all three elements. In learning the facts of science, students must learn appropriate vocabulary. In describing processes, they must use the proper terms and sentence patterns for expressing sequence, cause and effect, etc. In writing experiment reports (a "skill"), they must use the passive voice. The examples are endless, because *content and language are inextricably related*. Nevertheless, the language component is best examined in isolation. Let us do so now.

3.3.2 The Language Component

The purpose of the language component is to give students practice in using English as a tool for learning academic subject matter. Teachers can promote academic language proficiency in two ways, (a) by providing *explicit language instruction* when necessary, and (b) by taking care to build valuable *language experiences* into content-area work. One difference between our Foresee Approach and CALLA is that we assign greater importance to the first of these than Chamot and O'Malley do. Their writings contain little information about explicit language teaching, emphasizing instead the "experiential" route to academic language learning. The purpose of the language development component of CALLA, they state, is to give students

> sufficient practice in using language in academic contexts so that language comprehension and production become automatic and students develop the ability to communicate about academic subjects (*TESOL Quarterly* 1987: 234).

While we agree that participation in content-area activities is of great benefit in developing students' academic language skills, we believe that explicit instruction is often necessary to make students aware of many of the special features of academic language — grammatical structures, discourse markers, functions, etc.

Another difference between the Foresee Approach and CALLA is the organization of the language component. Chamot and O'Malley (e.g., 1986, 1987) identify four "aspects of language" to be included in this component: *vocabulary*, academic language *functions*, language *structures and discourse features* (grouped together), and language *skills*. Since vocabulary, or lexical knowledge, is clearly an aspect of what we may call "linguistic knowledge," as are structures and discourse features, we prefer to lump these three together, as shown in Fig. 1.5.

In our experience, many content-area teachers are unfamiliar with some of the important aspects of this component, especially structures, discourse features, and functions. This is

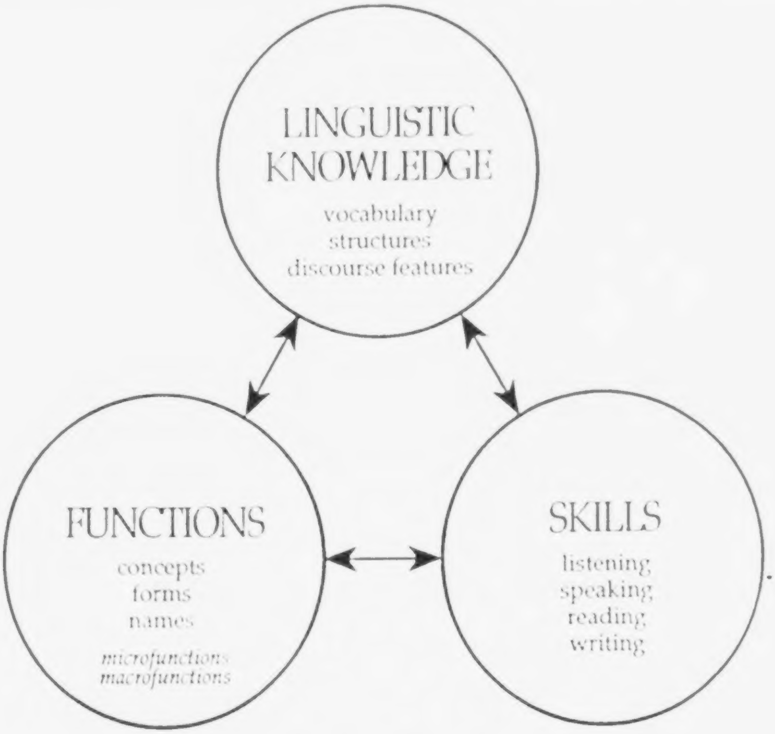
LINGUISTIC KNOWLEDGE
vocabulary
structures
discourse features
FUNCTIONS
concepts
forms
names
microfunctions
macrofunctions
SKILLS
listening
speaking
reading
writing

Fig. 1.5: The Language Component

understandable, as a full understanding of these matters generally requires a certain acquaintance with the field of linguistics, which most teachers lack. We hope the following brief explanations succeed in clarifying these aspects to a satisfactory degree, but we make no pretense at completeness here. With this note of caution, let us now proceed to examine each of the three subcomponents represented by the circles in Fig. 1.5.

(1) Linguistic Knowledge

(a) Vocabulary. All teachers recognize the need to teach students the specialized vocabulary and technical terms of each subject area, usually through explicit procedures. In geography, for example, students must learn the meanings of words like *peninsula, moraine, precipitation,* and so forth. Content vocabulary also includes common everyday words used in special senses. For example, *force* and *energy* have quite specific meanings in physics.

In our opinion, the vocabulary difficulties of ESL students go beyond the "specialized" terms of the content areas. Academic writing tends to contain numerous English words that are unfamiliar to students whose competence is limited more or less to what we have called "communicative" language. Words like *estimate*, *explanation*, and *approximately*, for example, are not especially common in everyday speech, though they feature prominently in academic language across the content spectrum. Both ESL and mainstream teachers should make a deliberate effort to identify and teach such potentially troublesome words.

There exist many useful techniques for teaching vocabulary, but we cannot go into the question of methodology in the limited space available here. For detailed information, see Seal (1991) and references cited therein. Just one piece of advice will have to suffice here. Teaching a word usually involves more than simply teaching its *meaning*, the usual focus of attention. Other aspects that may need to be explained about a word are its derivational roots (especially prefixes and suffixes), its part of speech (noun, verb, etc.), related derivatives (e.g., *explain - explanation - explanatory*), and potentially confusing "near synonyms" (other words that mean almost — but not quite — the same thing). Proper vocabulary teaching includes attention to details such as these.

(b) Structures. The second important aspect of linguistic knowledge is **structures**, or, more precisely, **grammatical structures**. By this we mean grammatical forms like verb tenses, articles, prepositions, relative clauses, sentence patterns, etc. that are commonly used in content areas. A good example is the passive voice, which is used extensively in science to describe processes, report experiments, and so on. Of course, the passive voice is also used in other subject areas, so students could practise its use across the curriculum if enough teachers devoted conscious attention to it.

Most content-area teachers do not consider themselves "language teachers," so they may avoid the responsibility of providing explicit instruction about important structures which their students may encounter. They may, in fact, find difficulty even in recognizing which structures are common in their disciplines. Again, collaboration between ESL specialist teachers and mainstream teachers is invaluable in raising awareness about such matters, and hence in bringing content-area material and tasks into the range of ESL students' capabilities.

(c) Discourse Features. The term "discourse" refers to the organization of language in units greater than the sentence. Although this is a complex topic involving many aspects of language, teachers need be concerned for the most part about only three kinds of discourse features: **rhetorical organization**, **discourse markers**, and **theme-rheme structure**.

Rhetorical organization refers to the way stretches of text larger than the sentence are constructed. The classic example is paragraph structure, often recommended to be "topic sentence → supporting details → concluding sentence." Other examples are textbook organization, the structure of friendly letters and business letters, the format of science experiment reports, and the organization of essays (descriptive, expository, etc.) and narratives. ESL students need to be taught about such important features of academic discourse.

The second important aspect of discourse that teachers might include in content-area instruction is the host of special terms — sentence connectors, "discourse linkers," and "discourse markers" — that abound in academic writing. There are literally hundreds of these, most of which are used to achieve **textual cohesion**. Terms like *nevertheless, in spite of, consequently, therefore, in contrast to,* and *on the other hand* are infrequent in everyday communication, so ESL students need to be taught their meanings and their proper grammatical usage. Content-area teachers do not have to conduct extensive research to identify such terms: all they need to do is refer to their textbook, each chapter of which will likely contain dozens of them. It is not surprising that ESL students will have problems with these, but if conscious, deliberate attention is paid to their explanation and practice, the problems will disappear, and students' academic language proficiency will increase dramatically.

A third important aspect of discourse structure is *the organization of information within sentences*. From the point of view of information organization, most sentences consist of two distinct parts:

a) the topic, or what is being talked about. Some linguists call this the **theme** of the sentence. It is followed by —

b) the comment, or what is said about the theme. This is often called the **rheme** of the sentence.

For example, consider the following discourse. Mary: "Where's your brother?" Bill: "He's in the shower." In Bill's response, *he* is the theme (what is being talked about), while *is ('s) in the shower* is the rheme (what is said about "he"). Notice that in normal discourse the theme typically consists of "given" information, whereas the rheme is usually "new" information. For simplicity, we call this correspondence **theme-rheme structure** in the lesson plans of Chapters 4, 5, and 6. It is evidenced, for example, in students' answers to written questions like "What is a meteorologist?" The response would be, *A meteorologist* (theme — given information — comes first) *is a person who studies the weather* (rheme — new information — follows theme).

(2) Functions

No aspect of the language component is harder for teachers to grasp than **functions**, or, to give them a more specific name, **academic language functions**. The functions of language, simply enough, are *the uses to which language is put*. But what does it mean to "teach functions"? If that means to "teach the uses of language," does it also involve teaching language itself? How do functions relate to structural and discourse features? Are there different types of functions? Is anything involved in teaching them (whatever that means) other than giving students a chance to practise? These and other related questions beg for answers, but few are usually forthcoming, even from ESL teachers. And if functions are a slippery topic for specialists, they are certain to be harder for content teachers to grasp. Let us try to demystify this obscure subcomponent.

It may be helpful to begin by comparing *academic language functions* (which we shall call **ALFs**) with *communicative language functions* (**CLFs**). The latter were discussed in Section 1.2, where we observed that one important objective of communicative language teaching was to develop students' proficiency in using language to express social functions like greeting, apologizing, etc. As an example, let us consider what is entailed in teaching the function of apologizing. Clearly, ESL students will already know what it means to apologize; they surely are able to do so in their native languages, both accurately and appropriately. We might conclude, then, that "teaching apologizing" does not mean teaching the actual function at all, since students already know it. The matter is more complicated than that, however. It is true that they will understand the general notion of what an apology is, but what they will *not* know are the *variety of English expressions* for expressing apology nor the *social conditions on their use*. Apologies in English range in force from a simple "sorry" or "pardon me" to "please accept my humble apologies," with many other expressions in between. Speakers of English automatically know which expressions to use in a given social situation, for example, that the first two of the phrases above — but not the last — are appropriate after accidentally brushing against someone in the hallway. Judging from this example, it appears that "learning a CLF" is mainly a matter of learning (a) the various expressions available to express the function, and (b) the social appropriateness of each.

We have discussed CLFs in some detail because they are fairly simple and may help to make academic language functions (ALFs) more easily understood. ALFs are the functions of language typical of content-area work. Defining, classifying, and hypothesizing, to choose three at random, are typical ALFs — they are common purposes of language in academic work, though comparatively rare in everyday conversation. It should be noted that functions need not be restricted to one category or the other (communicative or academic). Some, like arguing, describing, and asking for information, qualify as both CLFs and ALFs, although the ways of accomplishing them may differ somewhat from sphere to sphere.

Let us begin our discussion of ALFs by asking what is involved in teaching them. Unlike CLFs, the functions of academic work may not be clear to ESL students. Putting this another way, students may not understand the "conceptual" side of ALFs, what it *means*, for example, to define, classify, hypothesize, evaluate, report, and so on. One of the principal aims of content-area work should be to teach students these **concepts** themselves. Obviously, however, such functions cannot be accomplished effectively except through appropriate language **forms**, so considerable attention should be devoted to teaching these as well. To go one step further, teachers might consider emphasizing the **names** of the ALFs that their students are expected to express. ALFs are the uses of academic language, and ESL students — indeed, all students — should certainly know what these uses are called. Summing this all up, the three important aspects of teaching ALFs can be depicted by our usual triangle, as in Fig. 1.6.

There is more to say about teaching ALFs, but let us digress for a moment to consider a second important question about them, one that has not been widely addressed in the literature: can they be classified into different types? We propose that there are two basic kinds of academic language function. By way of introduction, it seems that the language involved in accomplishing certain ALFs would be relatively easy to teach. Functions in this category might include comparing, contrasting, classifying, predicting, exemplifying, and hypothesizing. On the other hand, many ALFs seem so general and so unrelated to specific linguistic forms that one would scarcely know where to begin teaching them. Some functions of this type are explaining, describing, justifying, persuading, synthesizing, and evaluating.

To capture this essential difference, let us categorize ALFs into two basic types called **microfunctions** and **macrofunctions**. *Microfunctions* are small-scale; they involve the performance of rather specific language tasks with comparatively narrow purposes. *Macrofunctions*, on the other hand, are larger-scale uses in the sense that they pertain to more general language tasks with broader purposes.

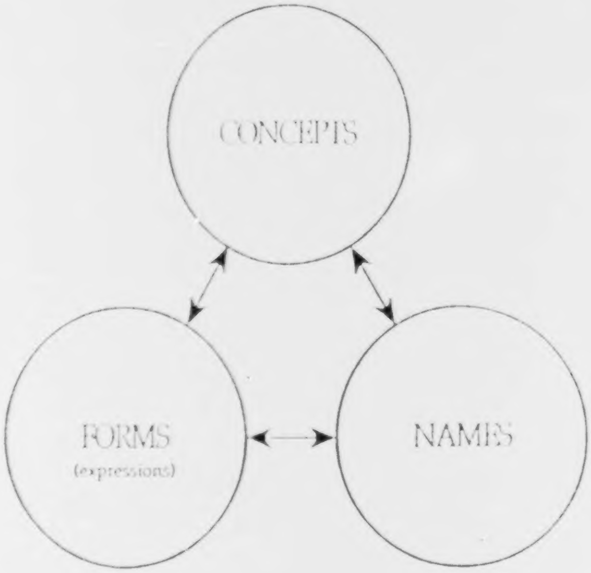

Fig. 1.6: Teaching Academic Language Functions

The difference is reflected in the interrelated domains of syntax and discourse features. Microfunctions can generally be accomplished by means of limited stretches of discourse, one or two sentences at most. Furthermore, they tend to be realized through a relatively small number of distinctive sentence patterns, thus allowing easily identifiable form-function matchups, and are often signaled by distinctive discourse markers (e.g., *therefore, if, is/are called*). To illustrate, consider the following examples of *defining*, a typical microfunction. These are taken from a senior 2 (grade 10) geography textbook (Headon *et al.*, 1989).

a) An *air mass* is a huge body of air containing similar weather conditions throughout.

b) These irregular deposits of varying heights **are called** *moraines*.

c) Fractures in the rocks of the earth's crust **are known as** *faults*.

d) Still further west, primarily in the semideserts of the Great Plains, soils are affected by *salinization*, **i.e.**, deposits of mineral salts left on the surface after evaporation of soil moisture.

The expressions in bold print are discourse markers commonly used (among others) for defining terms. Notice also the sentence patterns typical of this function. Other examples of defining could be added, but these should suffice to illustrate the linguistic nature of microfunctions.

Macrofunctions, in contrast, are usually accomplished through longer stretches of discourse, and are not necessarily associated with particular sentence patterns or helpful discourse signals. The reader might pause for a moment to reflect on what he or she would do if required to explain, describe, report, justify, or evaluate something. Clearly, there are no set formats for accomplishing such macrofunctions. How one chooses to go about the task depends on many factors, and it is highly improbable that any two writers (or speakers) would accomplish such a function in exactly the same way. One further point: since macrofunctions typically involve extended discourse, they are subject to linguistic analysis and description mainly on the discourse level rather than on the syntactic level.

Returning to the topic of teaching ALFs, it should be clear that procedures for teaching microfunctions will differ significantly from those needed for macrofunctions. Since microfunctions are typically related to identifiable sentence patterns and definite discourse signals, it is quite feasible for teachers to make these connections explicit. On the other hand, macrofunctions generally involve longer stretches of discourse, and are less clearly associated with distinctive formal features. Teaching these will therefore tend to be more difficult. For one thing, appropriate instruction of macrofunctions must necessarily focus more on textual and rhetorical organization than on sentence-level phenomena. But opportunities to practice such functions can be built into many content activities, provided that teachers are willing to do so, and with sufficient experience in accomplishing macrofunctions, students should eventually be able to acquire control over them.

Much more could be added here about the thorny topic of ALFs, but we hope the explanation above has succeeded in shedding some light on this important subcomponent. The sample lesson plans included in this manual will provide the reader with some practical ideas about how to teach these functions.

(3) Skills

It will not be necessary to go into as much detail about **academic language skills**, specifically, listening, speaking, reading, and writing for academic purposes. All teachers have a general understanding of the nature of these skills. No doubt the two literacy skills, reading and writing, are the most heavily emphasized in content-area classrooms. Both CALLA and the Foresee Approach, however, recommend that opportunities also be provided for practice of the two oracy skills, listening and speaking. Listening skills are particularly important for comprehending content-area material (lectures, explanations, instructions, etc.).

We shall not consider the matter of instructional practice here. Methods and procedures for teaching reading or writing can be found in numerous publications, and these topics are so vast that it would be futile even to begin discussing them. A good introduction to content-area reading can be found in Dubin & Bycina (1991). Some useful techniques for teaching writing skills are explained in Olshtain (1991) and Kroll (1991), and in the references cited in these articles. These sources are certainly worth consulting, but we want to emphasize that Foresee does not rely on any conventional method or methods of teaching academic language skills. Rather, our approach develops students' skills in an integrated fashion, as a natural by-product of motivated involvement in content-area work.

We would like to make one important point about teaching academic language skills, however. Teachers should avoid the tendency to view each skill as an undifferentiated ability. The expression "knowing how to read," for example, is really quite simplistic. The two writers of this manual know how to read, but both of us (like most people) have a lot of trouble comprehending income tax manuals and insurance policies, and would doubtless be lost trying to understand journal articles about nuclear physics or medieval dissertations on theology. The skill of reading actually divides into a rather large set of related subskills — reading for general ideas, reading for specific information, reading for pleasure, etc. The same is true about the other skills. Being able to write an entertaining and informative friendly letter, for example, does not mean that one can write a good formal essay.

The instructional implications of this general idea should not be hard to perceive. Each content area makes its own special demands regarding which aspects of the four skills are important. Teachers should therefore make an effort to provide practice in those subskills which are relevant to their fields. Examples of how this can be done are contained in many of the lesson plans included in this manual.

To conclude this explanation of the language component, we would like to describe how its three subcomponents interact with each other. Referring back to Fig. 1.5, linguistic knowledge is obviously essential to the accomplishment of functions and the performance of skills. Conversely, the need to execute ALFs and make use of academic skills will stimulate constant growth of the learner's knowledge about language — vocabulary, structures, and discourse features. As for the relationship between functions and skills, the latter are simply the modalities through which the various functions are actually accomplished. The two-way arrows in Fig. 1.5 are intended to indicate this set of interactions. Clearly, the Foresee language component operates as a closely integrated unit.

3.3.3 The Learning Strategies Component

The third and last component of Foresee, the one that sets it apart from other models of integrated instruction aside from CALLA, is the **learning strategies component**. Chamot and O'Malley have often emphasized that learning strategies are a unique feature of their approach, and in their publications and writings they generally devote considerable attention to explaining them. In their words, these strategies are "conscious techniques that facilitate learning both language and content" (1989). Chamot and O'Malley argue that students can dramatically improve their ability to understand and remember new information if they make a *deliberate effort* to learn and apply a variety of these learning strategies, ideally to the point of automaticity.

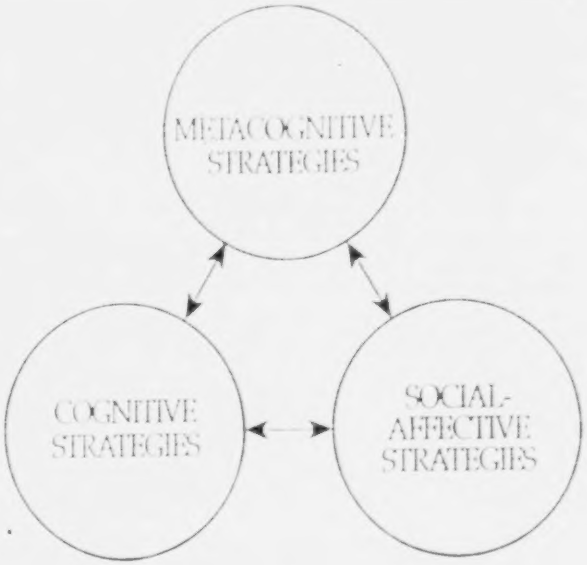

Fig. 1.7: The Learning Strategies Component

The learning strategies component is pictured in Fig. 1.7. The three categories represented in the diagram were established by Chamot and O'Malley as a result of personal research and an extensive review of previous studies of learning strategies (O'Malley & Chamot, 1990). A detailed list of learning strategies excerpted from Chamot & O'Malley

(1987) is shown in Table 1.1 on pages 36 and 37. Along with Chamot and O'Malley's descriptions of the various strategies, we include explanations, comments, or notes pertaining to the frequent applications of these strategies in Foresee instruction. The reader may find it useful to consult this table when reading through the many sample lesson plans included in Chapter 4. All of the specific strategies discussed below are taken from this table.

(1) Metacognitive Strategies

Roughly defined, metacognitive strategies are those relating to the decisions that students have to make about *how to approach or attack* learning and thinking tasks. These include strategies for:

(a) **Planning one's learning efforts.** Referring to Table 1.1, some important planning strategies included there are *Advance organization* (previewing material to be learned), *Selective attention* (deciding in advance to pay attention to specific language cues which will aid comprehension), and *Organizational planning* (planning the structure and content of written or spoken language that the learner intends to produce). The first two of these are **receptive** strategies, while the third is a **productive** strategy.

(b) **Monitoring one's understanding as learning proceeds.** This is called *Self-monitoring*. It can be receptive (periodically checking one's comprehension of written or spoken input) or productive (checking the accuracy and/or appropriateness of language produced).

(c) **Evaluating one's success at achieving an overall learning objective.** This is called *Self-evaluation*. It differs from self-monitoring in that the learner evaluates how well he or she has accomplished a task after it has been completed.

(2) Cognitive Strategies

These are strategies which can be applied directly to the tasks of understanding and learning. Such strategies tend to be either **mental** or **physical**, though most can actually be utilized in either mode.

(a) **Mental Strategies.** Referring to the list in Table 1.1, a good example of a "mental" cognitive strategy is *Imagery* (using visual images to understand and remember new information). Of course, it is also possible to use real physical images for this purpose, but this strategy can certainly be a mental one. Other mental strategies are *Grouping, Deduction/induction, Auditory representation, Elaboration, Transfer*, and *Inferencing*. (See Table 1.1 on pages 36 and 37 for explanations of these strategies.)

(b) **Physical Strategies.** The term "physical" means that these strategies involve the use or production of real materials, usually written. An example of a receptive cognitive strategy of this type is *Resourcing* (using reference materials like dictionaries, encyclopedias, or textbooks). Productive physical strategies include *Note taking* and *Summarizing*. Physical strategies are often called **study skills**, although Chamot and O'Malley prefer to avoid this term.

(3) Social-Affective Strategies

These are strategies through which the learner somehow enlists the support or assistance of other people (e.g., peers, teachers), or establishes an emotional or attitudinal state of mind conducive to success.

(a) **Social Strategies.** Chamot and O'Malley identify two of these, *Questioning for clarification* (soliciting help from someone else) and *Cooperation* (working with others to complete a learning task).

(b) **Affective Strategies.** The single affective strategy listed by Chamot and O'Malley is *Self-talk* ("reducing anxiety by using mental techniques that make one feel competent to do the learning task").

The importance of these strategies should not be underrated. They are not a "frill" that the teacher simply "tacks onto" the content and language components of lessons. Rather, they constitute a major pathway to empowerment, a means through which students can develop into efficient and independent learners. Chamot and O'Malley strongly recommend, as we do, that they be *explicitly taught* and *consciously practised* through the vehicle of content-area work. Explicit instruction should involve teaching the *names* of the strategies, although this can be done on a simplified level (see below). Some innovative ways of providing opportunities for the practice of learning strategies are suggested in the sample lessons and units later in this manual.

Students would likely have trouble grasping all these learning strategies if the topic were presented on too sophisticated a level. To solve this problem, Chamot and O'Malley have devised a set of **colour-coded sheets** (or transparencies) which list the basic strategies in each category in simplified terms. Versions of their sheets, modified to be appropriate for secondary ESL students, are appended to this chapter after the list of references. When taught via these sheets, the various strategies are comprehensible to all students. It is interesting to note the reasons behind the colours associated with the different strategy categories.

- Metacognitive strategies are **blue**, a "cool" colour suitable to the reflective process of "stepping back" from a learning task and contemplating how to approach it.

Table 1.1: List of Learning Strategies

NOTE: Column 2 contains Chamot & O'Malley's (1987) descriptions of the learning strategies, word for word; column 3 gives explanations, comments, or notes relating to the frequent application of the strategies in instruction using the Foresee Approach.

METACOGNITIVE STRATEGIES:

Strategies relating to the planning, monitoring, or evaluating of one's own learning.

Advance organization	Previewing the main ideas and concepts of the material to be learned, often by skimming for the organizing principle	A receptive strategy — looking at headings, subheadings, accompanying pictures or diagrams, etc., to get ideas about (and predict) the contents of a reading passage.
Organizational planning	Planning the parts, sequence, main ideas, or language functions to be expressed orally or in writing	A productive strategy — used when planning note taking activities, procedures for answering questions, etc.
Selective attention	Deciding in advance to attend to specific aspects of input, often by scanning for key words, concepts, and/or linguistic markers	Receptive — listening (or reading) for key words and discourse markers that will assist in comprehending the material, taking notes, etc. May also assist in production (question-answering) when students identify and underline the most important words in written questions.
Self-monitoring	Checking one's comprehension during listening or reading, or checking the accuracy and/or appropriateness of one's oral or written production while it is taking place	Receptive or productive — checking one's own understanding of the material while learning is going on, or checking the accuracy of one's work as it is being done.
Self-evaluation	Judging how well one has accomplished a learning activity after it has been completed	Receptive or productive — similar to *Self-monitoring*, but performed after the completion of the task. Often a collaborative endeavor enlisting the support of peers or the teacher.

COGNITIVE STRATEGIES:

Strategies which can be applied directly to the tasks of understanding and learning.

Resourcing	Using target-language reference materials such as dictionaries, encyclopedias, or textbooks	Often accomplished by making use of resources such as library materials, newspapers, fliers, magazines, etc.
Grouping	Classifying words, terminology, or concepts according to their attributes	Increasing one's understanding of content material by grouping together sets of things having similar characteristics. When the groups are *named* as well, this process is better called *Classifying*.
Note taking	Writing down key words and concepts in abbreviated verbal, graphic, or numerical form during a listening or reading activity	Often goes hand in hand with *Organizational planning* and *Selective attention* — e.g., writing a column of numbers and then listening for the answers to a predetermined series of questions.

Summarizing	Making a mental or written summary of information gained through listening or reading	Sometimes accompanies *Grouping*, since a summary may consist of information in a series of separate categories. Also, often follows *Note taking* as an end result.
Deduction/induction	Applying rules to understand or produce the second language, or making up rules based on language analysis	Actually two strategies in one. Used when wrestling with any problem of linguistic form (grammar, spelling, punctuation, etc.), either by applying rules already learned (*Deduction*) or by formulating one's own rules on the basis of available linguistic evidence (*Induction*).
Imagery	Using visual images (either mental or physical) to understand and remember new information	Using pictures to increase understanding, or making diagrams (e.g., Venn diagrams), charts, or other graphic representations to make information easier to understand and remember. Often accompanies *Grouping*.
Auditory representation	Playing back in one's mind the sound of a word, phrase, or longer language sequence	May be teacher-initiated. Used particularly in *Note taking*.
Elaboration	Relating new information to prior knowledge, relating different parts of new information to each other, or making meaningful personal associations to the new information	Basically, building upon one's previous knowledge of a subject. Often, learning more about a particular topic by *Resourcing* (doing research on particular subtopics). Also, may involve expanding one's linguistic expression of a topic or idea (words → sentences → paragraphs).
Transfer	Using previous linguistic knowledge or prior skills to assist comprehension or production	Making use of previously acquired linguistic knowledge or skill to assist in coping with a new and different learning task.
Inferencing	Using information in an oral or written text to guess meanings, predict outcomes, or complete missing parts	In the Foresee Approach, *Predicting* means guessing what will come next in a story or other reading passage. *Inferencing* means guessing at answers — to questions, when grouping or taking notes, etc.

SOCIAL-AFFECTIVE STRATEGIES

Strategies through which the learner somehow enlists the support or assistance of other people (e.g., peers, teachers) or establishes an emotional or attitudinal state of mind conducive to success.

Questioning for clarification	Eliciting from a teacher or peer additional information, rephrasing, examples, or verification	Basically, the strategy of actively seeking help from others (peers or teacher).
Cooperation	Working together with peers to solve a problem, pool information, check a learning task, model a language activity, or get feedback from an oral presentation	Many applications. Often used with *Self-evaluation*. Usually teacher-initiated (pairs, small groups).
Self-talk	Reducing anxiety by using mental techniques that make one feel competent to do the learning task	Sometimes involves the mental (or even spoken) "rehearsal" of the steps that need to be performed to accomplish a particular task.

- Cognitive strategies are **green** because they are fertile and productive ways of enhancing learning.
- Social-affective strategies are **pink**, a "warm" colour reflecting what Chamot and O'Malley refer to as the "warm fuzzy" nature of strategies involving interpersonal relationships and personal feelings.

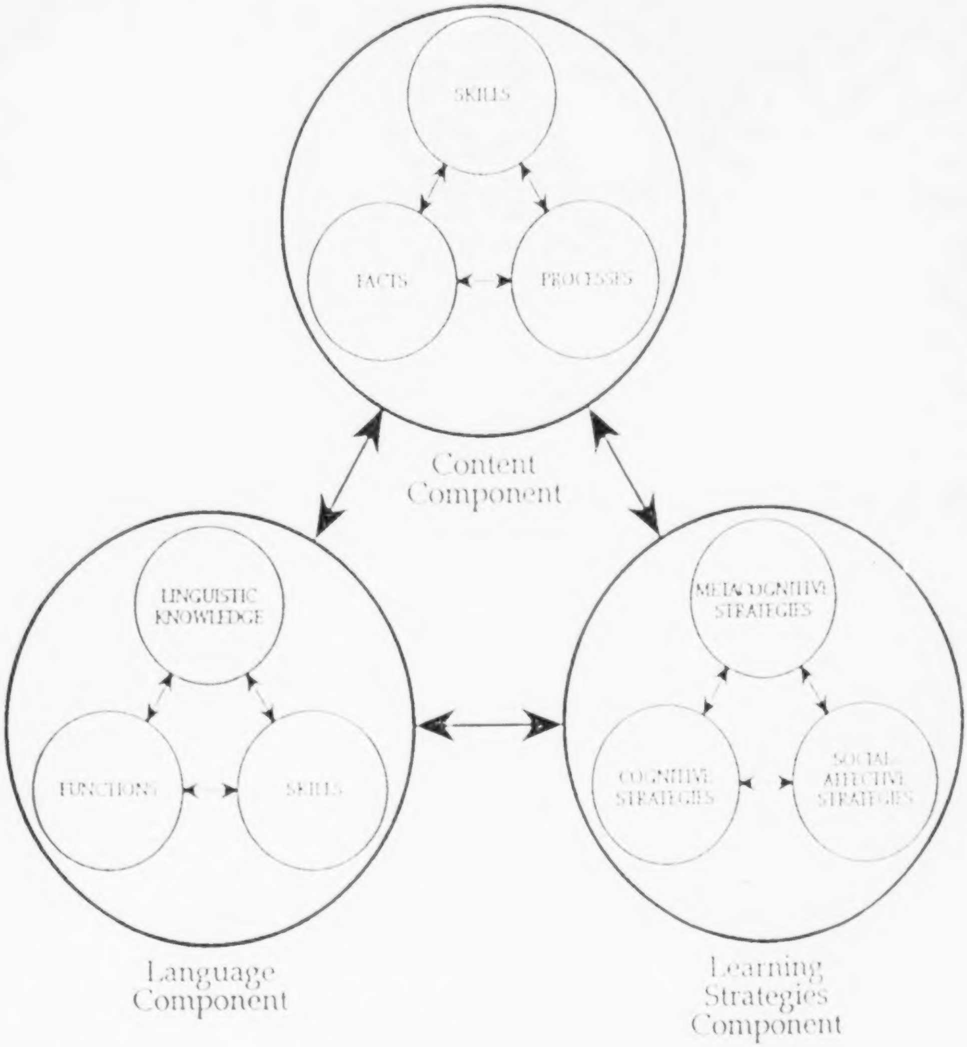
SKILLS
FACTS
PROCESSES
Content Component
LINGUISTIC KNOWLEDGE
FUNCTIONS
SKILLS
Language Component
METACOGNITIVE STRATEGIES
COGNITIVE STRATEGIES
SOCIAL-AFFECTIVE STRATEGIES
Learning Strategies Component

Fig. 1.8: The Foresee Theoretical Model (complete)

3.4 The Importance of the Foresee Theoretical Model

The various components and subcomponents of the Foresee theoretical model have so far been described and represented in rather a piecemeal fashion. We remedy this shortcoming in Fig. 1.8, which shows the model in its complete form except for the details of the language component and, in particular, the linguistic knowledge subcomponent (see Fig. 1.5).

Although the information in this long section may seem rather technical and only distantly related to the concerns of actual classroom instruction, we are convinced that effective application of our approach demands a certain degree of familiarity with the model pictured in Fig. 1.8. From the point of view of instructional planning, the Foresee theoretical model plays an extremely important role: *it provides the teacher with a comprehensive guide to making decisions about* ***lesson objectives***. Every Foresee lesson, as we shall illustrate in Chapter 4, contains a comprehensive set of objectives drawn from each of the components (and subcomponents) shown in Fig. 1.8. One practical advantage of our diagrammatic representation is that it makes these elements easier to remember by linking them together in a logical way.

3.5 Implementing the Foresee Approach: One Contribution from CALLA

So far we have focused exclusively, via our theoretical model, on the objectives or **content** of Foresee lessons — **what** they should include. In this section we would like to consider briefly the question of **how** Foresee can be implemented. Although we shall deal with this topic exhaustively in Chapters 2 and 3, we would like to take this opportunity to summarize one of the important contributions that CALLA has made to our Foresee procedural scheme.

Chamot and O'Malley propose that a CALLA lesson should be divided into **five phases**, as follows.

(a) **Preparation.** The teacher prepares the students for the lesson by helping them focus on the topic (e.g., students recall prior knowledge through brainstorming).

(b) **Presentation.** The teacher presents the new material by explaining it, having students read it, or in some other fashion.

(c) **Practice.** The students are asked to participate in some activity or to accomplish some meaningful task which will provide them with an opportunity to "actively manipulate both the concepts presented and the language skills needed to understand and express the new information" (Chamot & O'Malley, 1986).

(d) **Evaluation.** After (or sometimes during) the practice phase, some kind of evaluation of the students' understanding should occur. This can be accomplished in a number of ways (e.g., by the teacher, as a cooperative peer activity, or through self-evaluation).

(e) **Follow-up (Expansion).** The teacher introduces some activity "that provides students with an opportunity to integrate the new concepts and skills acquired in the lesson into their existing knowledge framework" (Ibid.).

This scheme, which we have incorporated into Foresee, obviously furnishes interested teachers with some useful guidelines for instructional planning. It constitutes an excellent format or framework for including all three CALLA components — content, language, and learning strategies — in the design of effective lessons. Nevertheless, it contains little in the way of detail about how teachers might exploit the subject matter of their content areas to plan and deliver interesting, exciting, and motivating lessons. In order to accomplish this, we argue, teachers must possess a repertoire of specific techniques and procedures for implementing integrated instruction in their classrooms. One way to begin developing such a repertoire is to examine carefully a variety of Foresee-based lessons and units that have been created — and preferably tested in practice — by teachers who are both familiar with the Foresee model and experienced in its application. As mentioned earlier, the sample lesson plans in Chapter 4 of this manual are intended for this purpose. We are confident that an intensive study of these will greatly reward any teacher who desires to implement one possible version of CALLA-based instruction, namely our Foresee Approach, in his or her classroom.

This chapter has presented a great deal of background information on the Foresee Approach, and has pointed the way to its implementation. There is yet another important step to be taken, however, before the sample unit plan in Chapter 4 can be fully understood and appreciated. The **application** of our approach is based on a synthesis of **theory**, **procedures**, and high-quality available **materials** that teachers can adapt to their purposes in preparing effective lessons and units for developing the academic knowledge and skills (content, language, and learning strategies) of their ESL students. The nature of this synthesis is explained in Chapters 2 and 3.

3.6 Why not "CALLA"?

We conclude this section with an obvious question: why not simply "CALLA"? Our approach is based so extensively and unabashedly on that of Chamot and O'Malley, critics may argue, that we might as well adopt CALLA directly as our model of instruction. Well, in the first place. "CALLA" is a copyrighted term, so we are legally prohibited from using it. But we believe there are three other good reasons for referring to our approach by a special name.

The first is that our Foresee Approach is not based *only* on CALLA. It is true that CALLA is the major foundation, but our model is erected also upon the other foundations discussed in Section 2 of this chapter. Many of these (e.g., Cummins's theories, cooperative learning, and of course strategies) are also incorporated within CALLA in one fashion or other, but not all are. Vygotsky's theory of learning and teaching, for example, is not. The Foresee Approach, clearly, encompasses more than just CALLA.

The second reason for inventing a new name is that our version of CALLA includes several modifications to Chamot and O'Malley's model. They do not, for example, make use of the triangular representational model we have introduced here. Furthermore, their language component does not consist of three elements, as ours does, and their account of academic language functions (or *ALFs*, another term original with us) does not differentiate between microfunctions and macrofunctions. Perhaps the major innovation in our interpretation of CALLA is our detailed analysis of the language component, which Chamot and O'Malley de-emphasize in favor of the learning strategies component. Other minor differences could be noted here, but it should be clear from these few examples that the account of CALLA presented above differs from the original version advanced by Chamot and O'Malley (1986, 1987, 1989). It seemed an appropriate decision, therefore, to call our model by a different name.

The third reason for this decision — probably the major reason, in fact — lies in the realm of practical application. Although we make use of many of the methodological ideas suggested by Chamot and O'Malley (e.g., the 5-stage lesson), the Foresee Approach embodies an original, very specific *process* for constructing lesson and unit plans. The essential features of this process will become clear in subsequent chapters.

4. The Continuing Need for ESL Teachers

As emphasized at the beginning of this chapter (Section 1.1), the Foresee Approach can be utilized by both ESL teachers and regular classroom teachers. Because the integrated instruction that we recommend is bound to result in ongoing language development through mainstream content-area work, some teachers and administrators may leap to the conclusion that the widespread implementation of our approach across the curriculum may reduce the need for ESL teachers or, indeed, eliminate this need altogether. We believe such a conclusion to be completely unwarranted, and we would like to conclude this chapter by expressing our vigorous opposition to any policy aimed at phasing out ESL teachers in our schools. For two decisive reasons, one theoretical and one practical, qualified ESL teachers would continue to be necessary even if the Foresee Approach should come to enjoy broad acceptance and application across the content-area spectrum.

The theoretical reason, surely a compelling one, is that Foresee (like CALLA) *is not designed to meet the needs of beginner-level ESL students*, i.e., those who enter our schools with virtually no knowledge of English. The first and crucial need of such students is to acquire a satisfactory degree of *communicative competence*, what Cummins (1979) called BICS — basic interpersonal communicative skills. As explained in Section 1.2 above, this sort of competence consists of control over the English vocabulary, structures, rules of social appropriateness, etc., that students require in order to get along in everyday social situations. It involves the ability to use language to perform important social functions like greeting, apologizing, accepting invitations, and the like. Such concerns lie almost entirely outside the domain of CALP and, *ipso facto*, are irrelevant to Foresee or CALLA. Most regular classroom teachers, even those versed in Foresee, would obviously lack the specialized training required *to help students develop this aspect of proficiency as quickly as possible*. The responsibility for doing so should continue to fall on the ESL teacher, who ideally possesses the necessary expertise to accomplish this task. Such expertise naturally includes an extensive knowledge of modern communicative language teaching (CLT) methods, as well as skill in applying these. It also includes an understanding of how to teach special aspects of language like pronunciation, basic grammar, and communicative language functions.

The Foresee Approach, like CALLA, was designed as a "bridge to the mainstream" (Chamot & O'Malley, 1987), although this "bridge" can be located within the mainstream classroom itself. Its purpose is to enhance the development of academic language proficiency, Cummins's CALP. We vehemently argue that it would be absurd to expect ESL students to cope with the language demands of content-area work prior to the acquisition of an adequate measure of basic communicative competence. Any regular classroom teacher who has attempted to teach the regular curriculum to students with zero English proficiency will surely concur, and training teachers to use the Foresee Approach will not help them to cope with such students any better than they have been able to do in the past. It would clearly be a serious error, then, to phase out ESL teachers entirely, since ESL specialists must continue to perform the crucial task of equipping beginner-level ESL students with the communicative competence required as a fundamental base for the development of academic language competence and for participation in content-area work.

There is a second reason, a more practical one, for retaining ESL specialists in our schools. Since most content-area teachers

> may be ill-prepared to "teach" language or even to recognize students' language-learning needs because of lack of training in language-teaching pedagogy, language teachers [should] become pedagogical resources for mainstream teachers who are willing to assume some responsibility for treating students' language needs (Snow, Met, & Genesee, 1989).

This latter group, obviously, would include all regular classroom teachers using the Foresee Approach. A lack of knowledge, both linguistic and pedagogical, will pose an especially acute problem for such teachers, because Foresee (like CALLA) is a sophisticated approach which demands a considerable amount of technical expertise for proper application. The logical source of such expertise within a school is the ESL teacher, whose knowledge about language, Foresee methodology, and useful materials can serve as a vital resource for mainstream teachers attempting to plan which aspects of linguistic knowledge, academic language functions, learning strategies, etc., to include in their lessons. As we see it, collaboration between ESL specialist teachers and classroom teachers is an essential ingredient of successful Foresee instruction across the curriculum. Widespread implementation of Foresee-enhanced instruction in our schools will therefore not obviate the need for trained ESL specialist teachers.

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METACOGNITIVE STRATEGIES

THINK:

How do I learn?

How can I learn better?

WHAT I CAN DO:

PLAN what I will do.

Use **SELECTIVE ATTENTION.**

MONITOR what I am doing.

EVALUATE what I have done.

COGNITIVE STRATEGIES

THINK:

How can I understand?

How can I remember?

WHAT I CAN DO:

ELABORATE prior knowledge.

TAKE NOTES of important ideas.

CLASSIFY or **GROUP** things to learn.

Make **INFERENCES** and **PREDICT.**

SUMMARIZE new information.

Use **IMAGES** and **PICTURES.**

SOCIAL AND AFFECTIVE STRATEGIES

THINK:

How can I help others learn?

How can others help me learn?

How can I feel more confident?

WHAT I CAN DO:

ASK QUESTIONS for clarification.

COOPERATE with classmates to learn.

Use positive **SELF-TALK.**

Chapter 2

Materials: The Key to Application

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Materials: The Key to Application

1. Applying the Foresee Approach: An Introduction

Good **materials** form the concrete component of the Foresee Approach. Such materials, selected and perhaps adapted by the teacher, are essential to effective practical application of the theoretical model presented in the previous chapter. If a teacher does not have access to actual "hands on" materials which can serve as the nucleus of classroom instruction, the Foresee Approach cannot be properly implemented. In a word, the materials provide the *vehicle* for the effective practical application of the theory.

Notwithstanding the importance of materials, however, we emphasize that teachers must have an adequate background knowledge of the Foresee model itself, since a solid theoretical understanding is invaluable in helping the teacher to decide which materials to select. The selection process is a crucial one, and generally takes a great deal of time and effort. Once suitable materials have been chosen, the teacher can use them as the concrete means for applying the theory implicit in the Foresee model. The **theoretical model**, as illustrated in Fig. 1.8 of Chapter 1, provides the criteria for establishing instructional objectives (content, language, and learning strategies), but the **materials** constitute the actual subject matter which the teacher can use as the basis for devising classroom procedures, activities, exercises, etc. The **application** of the Foresee Approach can therefore be regarded, at least in part, as a *synthesis* of theory and materials, as depicted in Fig. 2.1 below. (Note, however, that a third component called **procedures** is also important to the application process. This component, represented by the upper circle in Fig. 2.1, will be described fully in Chapter 3. For the moment, let us simply assume that procedures are guidelines to the planning of effective Foresee instruction.)

We should observe at this point that if teachers have not yet acquired the necessary experience in implementing our model, smooth and skillful application of materials to Foresee purposes can often prove difficult. Initially, the teaching suggestions and activities (i.e., procedures) provided in teachers' manuals may have to be heavily relied upon. As teachers become more familiar with the materials and their potential applications, however, they will begin to reassess or to question some of these procedures on the basis of the theoretical knowledge they have acquired. As new theoretical insights (e.g., the nature of the language and learning strategies components) become assimilated, the procedures may be improved to incorporate the new ideas. As the procedures are improved, the old materials sometimes become irrelevant and ineffective. Teachers may begin to look for different ways to manipulate the content, changing their selection of materials to achieve restated objectives. The selection and manipulation of the new materials will enable these teachers to develop new theoretical understandings. The resulting readjustment of their theoretical perspective, incorporating the new knowledge, will be reflected in a more refined and sophisticated procedures. Teachers will then have "fine tuned" the application, both theoretically and practically, justifying what they are doing and how they are doing it. The entire application process can be summed up in Fig. 2.1, which once again takes the form of our familiar triangle.

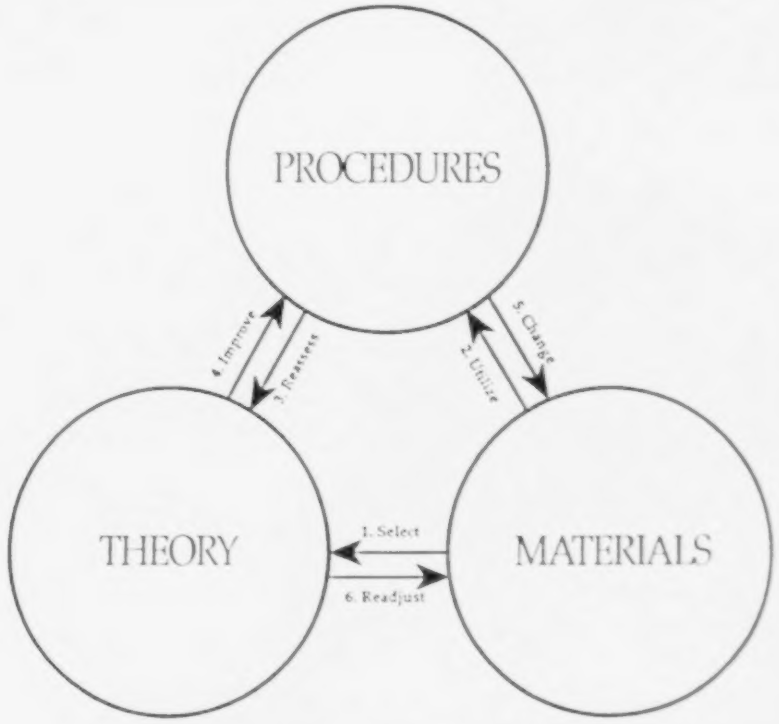


Fig. 2.1: The Foresee Application Process

If teachers lack a solid understanding of the Foresee theoretical model, which is a crucial foundation for application, it is unlikely that they will have the expertise to select, apply, change, or readjust materials, or to improve or reassess procedures. The teacher's manual will likely be followed "to the letter," and the knowledge of how to manipulate the materials to maximum effect will not be acquired. The main reason for this, of course, is that the theory generates the objectives, particularly the language and learning strategies objectives, that are crucial to true Foresee instruction.

As a final comment by way of introduction, the materials chosen as the basis for classroom activities will be dependent upon which themes or topics are chosen for the units which the teacher decides to develop. An explanation of how to plan and develop a Foresee unit will be presented in the following chapter.

2. Selection of Materials

There are a number of excellent resources or materials available for integrating language and content. Some of these provide teachers with concrete suggestions and activities which can aid in the fulfilling of the content, language, and learning strategies objectives generated by the Foresee model. These materials promote active involvement and interaction of the students in real learning situations rather than superficial ones.

2.1 Criteria of Good Materials

Good materials:

a) integrate and promote basic interpersonal communicative skills (BICS) and cognitive academic language proficiency (CALP) (Cummins, 1979; see Chapter 1).

b) allow the formulation of realistic and valuable content, language, and learning strategies objectives, as generated by the Foresee theoretical model.

c) are flexible and easily manipulated, and can therefore be adapted or modified to the needs of the students. It is particularly important that written texts be easily modifiable, so that they may be made comprehensible to ESL students.

d) are exciting, both visually and in content. Perhaps the most important criteria for selecting materials are that the visuals or pictures should be in colour, should be appealing, and should provide comprehensible input. (Note: Visuals and demonstrations are invaluable sources of contextual support for cognitively demanding content, and if they are utilized appropriately, the resulting Foresee instruction will lie squarely in quadrant 3 of Cummins's 2-dimensional theoretical framework for language proficiency, as described in Section 2.2.2 of Chapter 1.) If the materials excite the teacher, they will excite the students as well. Needless to say, if a teacher must constantly revise materials to try to make them work, they will not be interesting to the students. The materials should be so exciting and motivating that when students see the activities that their classmates in other groups have done, they will be eager to do these as well.

2.2 Where to Find Good Materials

a) **Publishers' Displays.** A publishers' display at any conference is an excellent source of real, current, and innovative materials. The discovery of wonderful new materials can often excite and encourage teachers to try different ways of thinking, and may lead to more innovative teaching practices. Ultimately the students reap the benefits of these innovative techniques, which are inspired by the manipulation of the new materials.

Teachers should always strive to find good materials which will assist them, as well as motivate them, to develop new themes or units. They should *not* become complacent once a few good units have been developed, satisfying themselves by reteaching those same units year after year and using the same resources. Teachers should constantly keep on the lookout for new materials which can promote change by stimulating and encouraging an ongoing evolution in instructional practices.

b) **Catalogues.** Catalogues are good resources, but only if the actual materials have been seen. If they have not, the teacher must resort to guesswork in deciding what to order, and more often than not the materials that arrive will fail to live up to expectations.

c) **Word of Mouth.** Teachers can easily use their colleagues as resources. Other respected ESL teachers can often be relied upon to provide information about recommended materials, why and how they use them, etc. Teachers may even visit their colleagues' classrooms to observe the materials and their applications in actual use. As a general rule, paying attention to word of mouth reports is probably the surest and most reliable way of determining which resources or materials are most effective, useful, and accessible.

A list of good materials which can be used for integrating language and content appears at the end of this chapter. All of the materials recommended contain many good sections, lessons, and units that are readily adaptable to effective Foresee instruction.

3. The Value of Accumulating Materials

Accumulating a large supply of materials is important to teachers concerned with teaching content, language, and learning strategies through application of the Foresee Approach. Teachers should have the concrete materials "at their fingertips" when developing a thematic unit, in order to ensure that the unit will continue to develop smoothly after the first few lessons.

One of the important duties of an ESL teacher is to ensure the successful integration of ESL students into their regular classrooms. This can be accomplished by assisting classroom teachers to integrate content, language, and learning strategies objectives into their own teaching units. At the elementary level, the ESL teacher can supply classroom teachers with attractive and motivating materials that they can use in implementing their own Foresee lessons and units. At the secondary level, however, mainstream teachers are less likely to want to use materials provided by the ESL specialist. In this context, the ESL teacher's main role should be to assist subject-area teachers in adapting and manipulating the content of their own curricular materials with a view towards incorporating modified Foresee procedures into their instructional repertoires (see Chapter 5 for details).

In conclusion, willing cooperation and communication between ESL teachers and the regular classroom teachers are essential. The end product of a collaborative policy is bound to be vastly improved instruction for the ESL/LEP students in our schools, both in ESL and in content-area classrooms.

4. A Resource List of Exemplary Materials

The following books are highly recommended as sources of interesting, motivating, and adaptable materials for planning Foresee lessons and units. We have drawn heavily upon the first of these, the Santillana *Bridge to Communication* series, in designing the secondary unit on weather described in Chapter 4.

The list below is certainly not intended to be exhaustive. Experienced teachers will likely be familiar with other resources containing high-quality textual materials, visual supports, stories, etc., for use at their particular level. Actually, almost *anything* can serve as a potential resource — books, magazines, newspapers, encyclopedias, etc. ESL teachers should always be on the lookout for interesting and motivating materials which can be used as the nucleus for developing content-based lessons utilizing the Foresee Approach.

We suggest that teachers write away for free catalogues on these materials. Such catalogues can be used as a basis for ordering particular books that will meet the individual needs of each instructional situation. We include the names and addresses of the publishers and/or Canadian distributors of all the resources we have selected.

Useful Materials

Bridge to Communication. San Diego, CA: Santillana Publishing Company, Inc., 1992.

- Middle Levels A, B, and C.
- Secondary Levels A, B, and C.

Write to:

Santillana Publishing Company, Inc.
901 W. Walnut St.
Compton CA 90220-5109
U.S.A.

Canadian Distributors:

Monarch Books of Canada Ltd.
5000 Dufferin St., Unit K
Downsview ON
M3H 5T5

Chamot, A. U., J. M. O'Malley, and L. Küpper. *Building Bridges: Content and Learning Strategies for ESL.* Boston, MA: Heinle and Heinle Publishers, 1992.

Books 1, 2, and 3 (Student Editions) are all useful, especially at the secondary level.

Write to:

Nelson Canada
1120 Birchmount Rd.
Scarborough ON
M1K 5G4

Prism: An Intermediate English Course. Toronto, ON: Harcourt Brace Jovanovich, 1992.

We recommend Student Books 1, 2, and 3, especially for the secondary level.

Spotlight: An English Course. Toronto, ON: Harcourt Brace Jovanovich, 1992.

We recommend Student Books 1, 2, and 3, especially for the secondary level.

For information on *Prism* and *Spotlight*, write to:

Harcourt Brace Jovanovich
55 Horner Ave.
Toronto ON
M8Z 4X6

Chapter 3

Implementing the Approach: The Development of Foresee Lessons and Units

Chapter 3

Implementing the Approach: The Development of Foresee Lessons and Units

1. Lesson and Unit Planning

In planning and developing a lesson or a unit using the Foresee Approach, the teacher can follow an orderly progression of steps. Each step is dependent upon, and evolves from, those preceding it. The purpose of the first section of this chapter is to describe the usual stages of the overall planning and development procedure, which constitutes the practical stage of Foresee application. In the second section we shall focus specifically upon one crucial aspect of application, namely *lesson procedures*, and in Section 3 we present a few final details about the *unit development* process.

(a) The First Step in Foresee planning is choosing the *theme or topic* for the unit. This decision relates directly, of course, to the selection of content. For regular classroom teachers, the choice is usually quite easy, since the curriculum can readily provide the necessary guidelines. For ESL teachers, in contrast, the selection process may not be as straightforward, and a good deal of latitude is ordinarily possible. ESL teachers should collaborate with regular classroom teachers in choosing topics or themes which *parallel*, rather than replicate, items in the mainstream curricula. The goal of integrated instruction within the ESL classroom should be to equip students with some of the content-specific linguistic knowledge and skills, as well as effective learning strategies, that will later serve to promote academic success in regular coursework. Choosing the topic is the most important and difficult decision for the ESL teacher because all the subsequent steps are dependent upon the chosen content. As Chamot and O'Malley themselves asserted in one of their presentations at the 1992 TESL Manitoba Conference, "everything is content-driven."

It should also be noted that the resources and materials available will also determine the choice of topic to some degree. Obviously, teachers will be tempted to select topics or themes for which they have ready access to attractive materials, as described in the previous chapter. As a final point, Chamot and O'Malley suggest that ESL teachers "choose high priority content, because they can't teach *all* of the content available" (Keynote Address, 1992 TESL Manitoba Conference).

(b) The second step is to select effective *materials and resources* as the basis of Foresee application, as discussed in Chapter 2. Materials which are rich in visual supports such as pictures, charts, graphs, diagrams, manipulatives, etc., will give rise to exciting and motivating learning activities. The materials, therefore, have a major impact on the quality of the unit.

Teachers new to our approach often make the mistake of deciding upon lesson topics first, and then trying to find appropriate materials to support the instruction of these topics. While this strategy can sometimes be effective, it generally involves a good deal of unnecessary hard work. We have found that it is usually easier to *begin* by searching through a variety of available resources, gathering a rich supply of materials that can then be used to generate a related sequence of individual lessons. An analogy from golf may help illustrate the point we are making here. Golf instructors often counsel their students against swinging too hard by advising them to "let the clubhead do the work." We suggest that teachers planning Foresee lessons and units should ***"let the materials do the work."***

(c) The third step is to determine the *content objectives* for the unit and for each lesson plan. The regular subject area teacher's content objectives tend to be quite specific and detailed, since the learning of the targeted content is usually the major aim of instruction. But even though the mainstream teacher's primary interest is content instruction, mastery of content by the students should not be viewed as an end in itself. Under the Foresee Approach, the content is also a vehicle for the teaching of language skills and learning strategies. The ESL teacher's content objectives, in contrast, will often be more general, with the content treated mainly as a means for teaching these other components. The difference in emphasis is reflected in the two terms introduced at the beginning of Chapter 1: *language-sensitive content instruction* versus *content-based language instruction.*

But although the content objectives chosen in the two teaching contexts may differ, there may be considerable similarity in the general manner in which ESL and regular classroom teachers develop their lessons and units. For both, effective application of the materials requires the development of learning activities which encourage the students to manipulate and interact with the content in ways which will ensure their understanding and retention.

(d) The fourth step is to develop and write the actual *lesson plans* for the unit. This procedure will be illustrated in considerable detail in subsequent chapters. Briefly, each lesson plan as conceived at this stage consists of *content objectives* plus *lesson procedures.* Detailed information about Foresee lesson procedures appears below, in Section 2 of this chapter.

(e) The fifth step is to identify the *language objectives* of each individual lesson. This is done at various stages during what we might call the "evolution" of each lesson plan. Some general language objectives may be determined before the actual lesson plans are written down, at the stage where the teacher may be developing an overall unit plan. Some examples of general objectives of this sort are writing a research report and making a summary. Other language objectives may be identified, and integrated into a lesson plan, as the procedures of the lesson are being decided upon and listed. Finally, after the actual lesson plan has been completed, it may be re-examined with a view towards identifying further specific language objectives that might be taught through the chosen content.

Regardless of the stage where they are identified or selected, the language objectives of a lesson can be categorized according to the scheme of the Foresee language component (see Section 3.3.2 and Figure 1.5 of Chapter 1). The language objectives might accordingly include the following:

(1) **Linguistic Knowledge**

i) **Vocabulary** — not only specialized academic vocabulary but also common, everyday words, including those which have special meanings in particular subject areas (e.g., *force* and *energy* in science). Content vocabulary may also include difficult "academic" words that are uncommon in everyday communication but widely used across the various content areas (e.g., *estimate, approximate, consequently,* and *summarize*). It is important that teachers be very specific about the vocabulary items they plan to teach in any lesson, and that they list them all as part of their lesson plan. Only then can they be sure that vocabulary instruction is complete and effective.

ii) **Structures** — grammatical structures which can be taught during the course of the lesson via the content work. Some examples are the various verb tenses (present, past, present perfect, etc.), the passive voice, articles, prepositions, comparative and superlative forms of adjectives, pronouns, relative clauses, and common syntactic transformations (especially the negative and question transformations or sentence patterns). The possibilities are rich and varied, but teachers must take a very analytical approach to the language to be used in each planned lesson if they hope to be successful at teaching all the grammatical structures that are potentially available for instruction. This may not be easy, especially for content-area teachers with little training in linguistic analysis.

iii) **Discourse Features.** As explained in Chapter 1, these can include specific rhetorical patterns common in academic work (e.g., paragraph and essay structure; experiment report format) as well as discourse markers typical of academic writing (e.g., *although, nevertheless, therefore*) and "theme-rheme" structure.

(2) **Functions.** Academic language functions ("ALFs") were explained in considerable detail in Section 3.3.2 of Chapter 1. We take it as obvious that one of the major objectives of content-area instruction should be to teach students how to accomplish the many language-related functions that are characteristic of academic work — defining, hypothesizing, contrasting, expressing cause and effect, etc. (typical microfunctions) as well as explaining, describing, reporting, summarizing, etc. (typical macrofunctions). Every lesson should include opportunities for students to practise some of these functions. In addition, as emphasized in Chapter 1, direct instruction about ALFs should often be provided.

(3) **Skills.** Opportunities for developing the four language skills of listening, speaking, reading, and writing can generally be included in every lesson. Teachers should make an effort to be as specific as possible about the particular aspects of each skill that they want their students to practise. As explained in Section 3.3.2 of Chapter 1, each of the four academic language "skills" can be broken down into a variety of subskills. Since each content area makes its own special demands regarding which aspects of the four skills are important, teachers should make an effort to provide practice in those subskills which are relevant to their fields. For example, reading for pleasure may be important in literature study, but reading for specific information is generally more common in science and social studies.

(f) The sixth step is to examine the content and the language of the lesson, in order to identify which *learning strategies* may be taught through the planned learning activities. These strategies should be stated, in very specific terms, in the "objectives" section of the lesson. The teacher must identify where and how these learning strategies will be used and applied during the course of the actual lesson. We are convinced, however, that "incidental" strategy instruction is not enough. Students need to be taught, on a *conscious* and *explicit* level, what these strategies are and how to use them. Following Chamot and O'Malley, we call this "direct strategy instruction." Some examples of such direct instruction will be given in subsequent chapters, but a few general comments about the teaching of learning strategies are in order at this point.

We consider the learning strategies as an essential aspect of instruction for both the classroom teacher and the ESL teacher. They are, admittedly, not the focus of any lesson. The content is the focus for the classroom teacher, while the language is the focus for the ESL teacher. The mastering of learning strategies, however, is a crucial step that students must take if they are ultimately to take control of their own learning and become autonomous, independent learners. For this reason, learning strategies should be an essential component of every lesson.

In order to teach the learning strategies, the colour-coded strategy sheets developed by Chamot and O'Malley (included as appendices to Chapter 1) are required. It must be emphasized, however, that all three sheets are **not** taught simultaneously. Such an instructional practice would be disastrous, as students would be thoroughly bewildered if they were given all the strategies at once. Logically enough, the sheets should be introduced one by one, beginning with the cognitive strategies (on the green sheet). The students should be given the sheet and instructed to keep it at the front of their binder as a reference source. The teacher should make continuous reference to the sheet during the course of each lesson. All the cognitive strategies on the green sheet should not be explained at one time, of course. They will be introduced one by one, and as the unit progresses they will be practised over and over again. The teacher should make a deliberate effort to incorporate as many of them as possible into every lesson. Once the students are fairly familiar with these cognitive learning strategies, the social-affective strategies (on the pink sheet) should be introduced. These strategies are fairly easy to understand. After they have become familiar to the students, the metacognitive learning strategies (on the blue sheet) can be introduced, and subsequently learned, one by one.

These colour-coded learning strategy sheets should be placed in students' binders in the following order:

BLUE — metacognitive
GREEN — cognitive
PINK — social-affective

They should always be readily accessible for reference, as these learning strategies are constantly discussed and "hammered home" in every lesson.

Summary of Steps:

To summarize, the steps for planning and developing a sequence of Foresee lessons are as follows:

1. Choose the topic or theme for the unit. (This determines the basic content.)
2. Select appropriate materials upon which to build a series of individual lessons.
3. Determine the content objectives of each lesson.
4. Write lesson plans (content objectives, procedures).
5. Identify the language objectives that suit the content of each lesson.
6. Identify the learning strategies that can be taught and/or practised in each lesson.

By following these six steps, teachers can provide their students with opportunities to manipulate the content, learn academic language, and practise learning strategies. These will, in turn, give them the power to facilitate their own learning. Good teachers should be able to "foresee" any difficulties the students are likely to encounter, and will therefore know what must be done to overcome these difficulties before the learning activities take place. In doing so, they will be "setting the students up for success."

2. Procedures

We return now to the Foresee "application process" which was introduced briefly in Chapter 2. This process is pictured in Fig. 3.1, a slightly modified version of the model shown in Fig. 2.1 of the previous chapter. The reader may recall that there remains one major application component still to explain. Chapter 1 was devoted to a detailed description of the theoretical component of the application process (i.e., the **theory** circle in Fig. 3.1), while Chapter 2 dealt with the important role of suitable **materials**. In this section we complete the picture by examining the **procedures** component, which sits at the apex of the application triangle in Fig. 3.1.

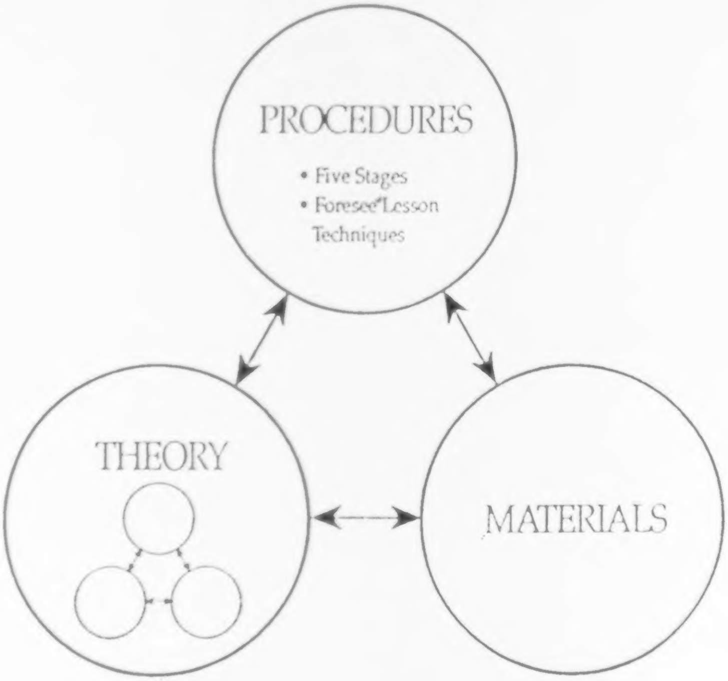


Fig 3.1: The Foresee Application Process (Revised)

Procedures are systematic guides to lesson planning. Needless to say, the best Foresee procedures are those that lend themselves in straightforward ways to the accomplishment of a variety of objectives (as generated by the theory component) and to the manipulation and use of selected materials. The procedures component sits at the top of the application triangle because it represents the actual "how" of Foresee instruction. It contains guidelines to two related but distinct levels of lesson design: **lesson organization** and **Foresee techniques**.

2.1 Lesson Organization: The Five Phases of a Foresee Lesson

Although exceptions are certainly possible, Foresee lessons normally follow the 5-stage format outlined in Chapter 1. This scheme, as the reader may recall, is taken directly from Chamot & O'Malley (1986; see the References at the end of Chapter 1 for sources cited in this chapter). It is well suited to the delivery of optimal instruction and practice in learning strategies, and also provides an excellent pattern for teaching content and language. The reader would be well advised at this point to review the information in Section 3.5 of Chapter 1, entitled "Implementing the Foresee Approach: One Contribution from CALLA."

Chamot and O'Malley (1986) refer to the five phases (stages) of a lesson as the "five organizing principles" for sequencing a lesson's activities. These five stages or organizing principles, as described in Chapter 1, are:

a) Preparation
b) Presentation
c) Practice
d) Evaluation
e) Follow-up (Expansion)

To expand slightly on the information given in Chapter 1, and to refresh the reader's memory, we here cite Chamot and O'Malley's summary of a typical CALLA lesson (1986, p.22; emphasis added).

> **Use five organizing principles to sequence the lesson's activities.** These five organizing principles are: preparation, presentation, practice, evaluation, and follow-up. During the **preparation** phase, the teacher gets the students ready for the lesson by helping them focus on the topic. This can be done by means of a brainstorming session in which the students contribute all the information that they already know about the topic to be studied. Next, the teacher gives the **presentation** of new material — either by explaining it, having students read it, showing a film or playing a tape. The new material must then immediately be **practised** by the students so that they can actively manipulate both the concepts presented and the language skills needed to understand and express the new information. After students have had an opportunity to practise using the new materials in a meaningful way, an **evaluation** of their understanding of the

> lesson should take place. This evaluation can be teacher initiated, it can be a cooperative peer process, or it can be a self-evaluation. Often the evaluation is built into the practice part of the lesson, so that students are constantly checking as they work on new problems. Finally, the teacher should plan for a **follow-up** activity that provides students with an opportunity to integrate the new concepts and skills acquired in the lesson into their existing knowledge framework.

This scheme allows a very *balanced* instructional format, in that the first two phases (preparation and presentation) tend to be "teacher-directed" while the last three (practice, evaluation, and follow-up) are generally "student-centred." (Note: These two terms are taken from Chamot & O'Malley, 1989). Good teaching in the two teacher-orchestrated stages will empower students, setting them up for success in subsequent phases where they can take control of their own learning.

Needless to say, there is nothing especially new or original about this format. Surely all good teachers make a point of activating background knowledge before presenting new material to be learned. They also provide opportunities for practice, self-evaluation, and follow-up as a way of ensuring that students assimilate the material, reflect upon their success in having learned it, and extend their knowledge into other areas. What is unique to CALLA, and especially to the Foresee Approach, is that the five stages or phases of a lesson are all conceived and exploited as separate contexts for the development of language skills and for the teaching and practice of learning strategies. Unfortunately, it is very difficult to explain exactly how this goal can be accomplished without making reference to actual examples of Foresee lesson plans. We hope that the lesson examples in Chapter 4 will succeed in clarifying the 5-stage planning process for teachers who wish to implement our approach.

2.2 Foresee Techniques

We conclude this discussion of procedures with a separate section on Foresee **lesson techniques**, which constitute the second level of our procedures component. One significant difference between CALLA and Foresee is that Foresee application often involves the utilization of certain special *techniques* or *instructional procedures* that have not yet been incorporated quite so deliberately nor explictly into CALLA methodology. The Foresee Approach places far greater *specific* emphasis than CALLA on the level of technique. Most of the techniques used in the sample lessons below can be easily adapted to suit the needs of any teacher willing to make the effort to implement the Foresee Approach in his or her classroom, either ESL or mainstream.

In order to illustrate our notion of useful Foresee techniques, and also to give the reader a few of these to adapt to his or her own purposes, we describe five such techniques below. Each technique is illustrated through at least one lesson (and usually more) in the sample unit on weather in Chapter 4. We begin with general descriptions of three original techniques called the **Text Questioning Technique (TQT)**, the **Research Technique**, and the **Presentations Technique**. These are followed by descriptions of two techniques that have been extracted from the sample lesson plans in Chamot & O'Malley (1986). We call these the **Dictated Instructions Technique (DIT)** and the **T-list Procedure**.

2.2.1 The Text Questioning Technique (TQT)

This technique is particularly useful for introductory lessons on virtually any topic or theme. In order to illustrate its use as clearly and thoroughly as possible, we shall describe it according to the five-stage format. Information is also included about some of the key language features and learning strategies practised during the different phases. The learning strategies are shown in bracketed italics, and are situated on the page according to the following convention: **metacognitive strategies** are listed on the *left*, **cognitive strategies** are in the *middle*, and **social-affective strategies** are on the *right*. Note that the strategies that are listed should be assumed to apply to the activity that has preceded them on the page.

As a preliminary planning step, the teacher chooses — from the students' textbook or some other suitable source — a reasonably short but informative reading passage on the target topic, making sure that this selection is accompanied by a title and as many of the following as possible: subheadings, pictures, diagrams, charts, or any other visual supports. The teacher also prepares a comprehensive list of WH-questions on the content of the passage.

General Outline of The Text Questioning Technique (TQT)

A. PREPARATION (Brainstorming) - Speaking

1. (Students are given a reading passage accompanied by some of the following: title, subheadings, pictures, diagrams, captions, etc. It is assumed here that the selection is in a book.) Tell students to **OPEN** books and predict what the passage is about, without reading it. (one minute).

[Advance organization] *[Predicting/inferencing]*
[Imagery]

2. Tell students to **CLOSE** books and write down predictions. Spelling and sentence structure are not important at this time.

3. Listen to predictions (brainstorm); write the key words (vocabulary) on the board or overhead.

4. Tell students to **OPEN** books, and conduct a discussion of the title, pictures, diagrams, etc. If necessary, ask pointed questions to elicit important vocabulary items that have not yet been mentioned. Try to get students to predict the contents of the passage as completely as possible. Students do not read the passage at this point!

[Predicting/inferencing]
[Imagery]

B. PRESENTATION - Listening

5. Tell students to **CLOSE** books.

   a) Students silently read a numbered list of questions which the teacher shows them (on the board, previously concealed, or on the overhead projector).

   b) After silent reading, read the questions aloud to the students one by one, reviewing any vocabulary they do not understand. Underline key words that the students will be listening for in step 7, using chalk (or a felt pen) of a colour different from the one the questions are written in.

[Selective attention]

6. Instruct students to number their papers (left-hand side) 1-n ("n" being the number of questions on the list), in preparation for note-taking. They should also label A, B, C, ... parts to questions, where they occur.

[Organizational planning]

7. Read the passage aloud fairly slowly. The students listen carefully for the answers to the questions on the board, writing these answers down in short form (1 or 2 words, abbreviations, or numbers) beside the appropriate numbers on their papers.

[Self-monitoring] *[Note taking]*
[Auditory Representation]

8. Read the passage aloud a second (and, if necessary, third) time, to ensure that the students have answered most of the questions and to give them a chance to check their answers. Increase the speed of delivery each time.

[Self-monitoring]

C. **PRACTICE** - Reading and speaking.

9. Tell students to **OPEN** books and read the passage silently (their comprehension should be high, as they now understand the topic and know key vocabulary). Then, in pairs or small groups, they compare answers and check them against the open text to verify and produce:
    a) correct answers
    b) correct spelling.

   Students should ensure that their answers are spelled correctly, and that all abbreviations are expanded (10 minutes). Circulate and help the students when they request assistance.

[Self-evaluation] *[Elaboration]* *[Cooperation]* *[Questioning for clarification]*

D. **EVALUATION** - Speaking.

10. Tell students to **CLOSE** their books, and ask individual students to contribute their answers to questions on the list. Write their correct replies (1 or 2 words) beside the questions, using the same colour of chalk (or felt pen, if using the overhead) as was used for the underlining of key words in step 5(b). The students should correct their errors at this point.

[Self-evaluation]

E. **FOLLOW-UP** - Writing.

11. Books remain **CLOSED**. Demonstrate how to write proper declarative sentences (answers to the questions) by using (a) most of the words in the questions, and (b) the answers on the board. The key words in the questions are already underlined in the same colour as the answers (see steps 5(b) and 10). Now underline, in the same colour, additional words and phrases which the students can use in their answers. Draw arrows to show how the declarative sentence answers can be derived from the questions. Then, working individually, the students write the answers in complete sentences.

[Deduction/induction]
[Elaboration]

12. Working with their partners, the students edit their work.

[Self-evaluation] *[Deduction/induction]* *[Cooperation]*

13. When students think their answers are correct, they present their final drafts to the teacher and read their answers aloud.

The general procedure described above has the paramount virtue of being extremely flexible. It can be employed in any subject area and for any topic, provided that a suitable reading passage can be found. Although its use was pioneered at the grades 3-6 level, it has been shown to be effective with secondary students as well. It can be used with ESL-only groups or, more significantly from the viewpoint of this paper, with mixed classes containing both ESL students and native speakers of English. It is straightforward and relatively easy to implement. Finally, it accommodates well to the five-stage lesson format recommended by Chamot and O'Malley, offering the teacher a systematic and adaptable scheme for developing language skills and learning strategies through content-area work. For specific examples of the application of the TQT, see Lessons 1, 3, and 9 of Chapter 4.

2.2.2 The Research Technique

This technique requires students to engage in individual research on particular aspects of the main topic. For example, in Lesson 12 of Chapter 4 each student investigates a weather condition or system (e.g., tornado, hurricane, monsoon) of his or her choice. We shall illustrate this technique by referring to the procedures followed in this particular lesson.

The students begin by selecting, from the main topic, some particular aspect that they would like to research. In this instance the overall topic is weather systems; each student therefore chooses one particular weather system or condition to investigate. The teacher takes the students to the library, where they sign out books containing information about these systems. Back in the classroom, the teacher presents them with an **outline** to use when compiling their data. The teacher carefully *models* the process of using the outline by completing it for a weather system that has not been chosen by any of the students. (See Chapter 4, Lesson 12, *Procedures* section for a copy of this outline.)

The students then complete their own outlines as the teacher has done, reading their books and filling in the information as they find it. Meanwhile, the teacher circulates around the room and gives students any assistance they may require. After the students have finished their first drafts, they edit them with the help of assigned partners. Then each student reads his or her outline to the teacher, who helps edit it for the final draft.

This activity gives students an opportunity to practise the specific language skills of reading for information and writing notes which can later be expanded into well-written paragraphs or essays. They also gain experience in using a variety of learning strategies, including the metacognitive strategies of *Organizational planning* (planning the parts and sequence of information to be expressed orally or in writing) and *Selective attention* (looking for key words in the text to help them fill in the outline). They practise the cognitive strategies of *Resourcing* (using reference materials to gather information), *Imagery* (using pictures accompanying their written texts to help them understand and remember), *Note-taking* (from a written text), and *Summarizing*.

2.2.3 The Presentations Technique

The activity generated by this third technique, class presentations, follows directly from the research that has just been completed. As a result of their individual investigations, the students have each acquired extensive knowledge about some aspect of the main topic. In the weather unit, everyone has become an expert about his or her own weather system or condition. All students now have the task of presenting their research findings to the whole class, as explained in detail in Lesson 13 of Chapter 4.

As a preliminary step, the teacher informs the students of the order of presentations and encourages them to practise reading their research projects aloud at home. The students are then given a "summary outline form" that follows the same order as the outline for their research project. (See Chapter 4, Lesson 13, *Materials* section for a copy of the summary outline form used for the weather systems presentations.)

In the presentation phase of the lesson, a designated student stands at the front of the room, shows a picture or other visual of his or her own weather system, and reads his or her research findings slowly to the class. As the presenter reads, the students listen and take notes on the form provided. Usually two additional readings are necessary, the second to help students complete their summaries and the third to give them a chance to check their answers. Note that this procedure gives the presenter a purpose for reading *clearly* and *carefully* to the class, instead of rushing through the presentation just to get it over with. Successful performance of this task can help boost the self-confidence of presenters, who suddenly discover that they possess adequate speaking skills for communicating complex information in English. The other students in the class benefit also, as they are given the opportunity to learn about other weather systems, practise their listening skills, and make good use of the metacognitive strategy of *Selective attention*. Above all, they must pay active attention to each speaker, and cannot just "tune out" until it is their turn to present.

After each presentation, the note-taking students are divided into pairs or small groups. Within a definite time (e.g., 5 minutes) they compare their answers and revise them where necessary. After this task has been completed, the presenter assumes a teaching role and corrects the information with the class by completing the outline on the board (or transparency). To begin, the presenter fills in the title. Then he or she asks the class for information about the first category. In our example, where this category is "causes," the first question might be "What are the causes of this weather system?" The other students volunteer the information they have compiled, and the presenter writes it on the board (or transparency) correctly. The other students check the presenter's written details against their own, correcting spelling and punctuation when necessary. (Note that each presentation consumes a good deal of time, and normally only one or two can be given in an average class period; consequently, this entire activity may take a week or longer to complete.)

This technique obviously promotes the development of a number of important language skills, especially the oral skills of speaking (making an oral report) and listening for specific information. It also lends itself well to the direct instruction of learning strategies and the practice of a wide range of strategies including *Selective attention*, *Organizational planning*, *Self-monitoring*, *Self-evaluation*, *Note taking*, *Summarizing*, and *Cooperation*.

2.2.4 The Dictated Instructions Technique (DIT)

Many lessons in various subject areas involve teachers giving instructions to students about some activity to be performed. In science classes, for example, teachers typically instruct students about the sequence of operations in an experiment, prior to having the students perform the experiment themselves. Typically, such instructions are written on the chalkboard or overhead transparency for students to copy, or photocopied instructions are distributed to all. In their Sample Science Lesson 1, Chamot and O'Malley (1986) utilize an interesting technique for instructing students about the steps of an experiment. This procedure, which we call the "Dictated Instructions Technique" or "DIT," promotes the development of a number of language structures (especially the passive voice) as well as language skills and learning strategies which would receive no attention in conventional instruction. Among these are listening comprehension skills, note taking skills, and the learning strategies of *Selective attention*, *Cooperation*, and *Questioning for clarification*.

This procedure is illustrated in Lessons 2, 6, 10, and 11 of Chapter 4, where it is utilized exclusively for the teaching of science experiments. Because the DIT is most commonly used for this purpose, we have structured the general outline below to reflect this particular application. We emphasize, however, that the procedure can easily be modified to suit other types of activities in which students are required to follow a set of directions to complete some task.

General Outline of a Science Experiment Lesson Using The Dictated Instructions Technique (DIT)

A. PREPARATION - Listening, speaking, and writing

1. Prepare the students for the experiment to follow by reviewing the science topic or question it aims to investigate. Ask questions which will activate their current knowledge schemata and lead to the formulation of an experiment objective (what the students will try to find out about the topic or question under discussion). Using the students' ideas and contributions as far as possible, write (on the chalkboard) key words and phrases that can subsequently be used to construct a formal statement of the experiment objective (e.g., *determine, discover, measure, construct*).

2. Discuss the 6 parts in a science experiment report, writing key vocabulary items on the chalkboard and explaining what they mean: *Objective, Apparatus, Method, Observations, Conclusions, Diagram.* Review this information quickly if students are already familiar with it. Tell the students that these will be the parts of their report, beginning with the objective.

3. Returning to the experiment objective, use the key words on the board (step 1) to write a formal statement of the objective, using student suggestions about grammatical structure as far as possible. (Since the objective will likely begin with an infinitive, explain to the students that this is not a full sentence; it is a conventional way of stating an objective.) Tell the students to begin the experiment report on a blank page of their notebooks. Entertain suggestions about a title, and choose the appropriate one; have them copy it at the top of their page. Then instruct them to write the subheading *Objective:* followed by the formal statement on the board.

4. Show, discuss, identify, and write down the names of the equipment they will use in performing the experiment. Instruct them to write the subheading *Apparatus:* and list the equipment to be used. Advise them to listen carefully for these key words in the dictation activity to follow. The students are now prepared for the experiment: they know the objective and apparatus, and have begun their formal experiment report.

[Organizational planning]
[Selective attention]

[Predicting/inferencing]
[Elaboration]
[Imagery]
[Deduction/induction]

B. PRESENTATION - Listening and writing

5. Distribute a worksheet containing the steps of the experiment (method) numbered 1, 2, 3, etc., but with many of the words replaced by blank spaces. The students will fill in the blanks during the dictation in step 6. The number of blanks to leave in each step, as well as the types of words to be omitted, will depend on the proficiency of the students. Initially, you may wish to omit only the sentence-initial imperative verb of each instruction plus certain key nouns (especially the apparatus terms they have learned). In another experiment, omit verbs and prepositions. For more advanced students, omit verbs and entire phrases (e.g., noun phrases consisting of nouns preceded by articles or other determiners, or entire prepositional phrases).

6. Dictate the method instructions to the students, using the imperative form of verbs and making use of discourse cues like *first, second, . . . next,* and *finally.* The students fill in the blanks in their instruction sheets, using abbreviations if necessary. Dictate the passage a second time, to allow them a chance to fill in gaps and check their work.

[Organizational planning]
[Selective attention]
[Self-monitoring]
[Note taking]
[Auditory representation]

C/D. PRACTICE/EVALUATION - Reading and speaking

7. Group the students in pairs or small groups. Instruct them to compare their notes and pool information, expanding abbreviations to produce complete and accurate instruction sheets. Assign a time limit (e.g., 10 min.). Circulate to provide assistance.

[Self-evaluation]
[Deduction/induction]
[Cooperation]
[Questioning for clarification]

8. Ask individual students to dictate steps of the method from their completed sheets, and write these on an overhead transparency of their worksheet, filling in the same blanks as the students did. Discuss spelling and grammatical structures where pertinent.

[Self-evaluation]
[Deduction/induction]

9. Instruct the students (in their pairs or small groups) to go ahead and perform the experiment, following the instructions on their sheets. If appropriate to the experiment, have them record observations on a separate sheet (preferably one prepared for them, containing a scheme for recording information, e.g., a chart).

10. When the experiment is completed and observations recorded, have students draw a labeled diagram of the experiment setup.

[Selective attention]
[Self-monitoring]
[Transfer]
[Note taking]
[Imagery]
[Cooperation]
[Self-talk]

E. FOLLOW-UP - Writing

11. Using the previously completed transparency of the method, demonstrate how each step can be changed from the imperative form to the passive voice. Tell the students they must use the passive because they want their report to be impersonal, avoiding "I" or "we." During the demonstration, focus on structural points like (a) using the object of the imperative verb as the subject of the new sentence; (b) how the passive is formed, using (c) a form of the verb *to be* (*was* or *were* - discuss subject-verb agreement) and (d) the past participle (discuss regular past participles and supply correct forms for all irregular verbs in the list). Use arrows to show how the sentences are transformed. Model the first few on the transparency, producing the first few numbered sentences of the *Method* which the students can now begin entering on their experiment reports (after *Apparatus*). Then let the students complete the formal write-up of the method, all in the passive. They can check each others' work when completed.

12. The *Observations* and *Conclusion* can subsequently be discussed and entered, completing their reports. As a final step, students can cut out their reports, diagrams, and observation charts and glue them onto coloured construction paper to produce an attractive end-product.

[Self-evaluation]
[Deduction/induction]
[Elaboration]
[Cooperation]

Note: This procedure can be modified in many ways, to suit the experiment.

2.2.5 The T-List Procedure

This technique is explained in Chamot and O'Malley's (1986) Sample Social Studies Lesson 2. Like the TQT and DIT, the T-list Procedure aims to improve students' listening comprehension skills and provide practice in using the learning strategy of selective attention. The teacher explains to students that they are going to hear a short passage on a particular topic. The passage, they are told, will contain a number of discourse markers that will give clues as to the sequence of ideas, whether pieces of information are main ideas or supporting details, etc. When the passage is dictated (or a tape is played), the students make notes on a "T-list." This is simply a page with a vertical line down the middle, sometimes with certain information already on it. On the left side, the students note the "main ideas" of the text. On the right, they write "details and examples" (i.e., supporting information) beside the corresponding main ideas. Through this exercise, the students gain skill at identifying main and subordinate ideas by attending to discourse cues of various sorts. The first few times the procedure is used, the T-lists provided to students may contain a good deal of information already on them, so students need only fill in the missing information. As they develop more skill at note-taking, they can eventually fill in their T-lists without such assistance. Follow-up activities can include the writing of paragraphs or essays based on the abbreviated information in the T-lists.

The T-list Procedure is obviously a very adaptable technique that can be applied using many texts in different subject areas. It is also flexible, allowing many possibilities for follow-up activities that suit the needs of different topics and texts. For examples of the application of the T-list Procedure, see Lessons 5, 7, and 15 of Chapter 4.

3. Unit Development

Foresee application in ESL classes generally follows a **theme-based approach**. This type of approach is discussed in a variety of sources concerned with either elementary-level education in general (e.g., Gamberg et al., 1988), ESL education in particular (e.g., Brinton, Snow, & Wesche, 1989), or a combination of both (e.g., Enright & McCloskey, 1988), so we make no claims to originality in this regard. Nonetheless, the way in which we structure theme-based units to fulfil the aims of Foresee instruction (teaching language, learning strategies, etc.) is perhaps somewhat different from previous applications along these lines.

Once the topic or theme is chosen and the materials are being selected, the unit will begin to develop and evolve. As emphasized in Chapter 2, supportive materials are vital for the successful development of any unit. If the materials are insufficient or inadequate, there will be nothing to base the learning activities around. When searching for supportive materials, teachers should select exciting resources which will promote stimulating lesson plans. These materials will provide a progression or sequence for successive lessons. In other words, one lesson will lead into another — each lesson will be dependent upon and build upon the lesson before.

Foresee units designed for ESL classes tend to be highly **integrated** in terms of content areas. Many different subject areas can usually be incorporated into, and taught via, any unit. Usually science and mathematics, or social studies and mathematics, can be integrated within a given unit. Language arts can generally be made an integral part of every lesson and every unit. In regular subject-area classrooms, of course, instruction tends to focus on specific disciplines. Foresee units of the integrated type can be implemented to some extent in such settings as well, though the primary focus generally remains on particular content areas.

As a unit develops, the teacher will usually find that a pattern will emerge. At this point, a summary of the unit can be made. An example of such a summary is included in the introduction to Chapter 4. Summaries are very useful in helping the teacher to stay on task and maintain a desirable direction for the unit.

Although units may develop in any direction that the students' needs and the teacher's imagination may take them, we have found one particular pattern to be extremely effective and easy to implement for a wide variety of topics. The unit described in Chapter 4 follows this format to some degree, and the reader may find it easier to understand the development of that unit if this general scheme is made explicit. The pattern is as follows.

Lesson A: **Introduction to topic.**
Use the Text Questioning Technique (TQT).

Lesson(s) B: **Consolidation lesson(s).**
Provide activities that develop the students' basic understanding of the main theme. Science experiments using the DIT, T-list lessons, and even additional TQT lessons can be included for this purpose.

Lesson C: **Research lesson.**
Use the Research Technique.

Lessons D: **Presentation lessons.**
Use the Presentations Technique. (Note: Normally a number of class periods will be required for all students to give their presentations.)

Lesson(s) E: **Extension lesson(s).**
Science experiments, math word problems, creative writing, etc.

This format provides a convenient framework around which to construct effective units. We believe that our various Foresee techniques make the job of unit planning a relatively straightforward process, and we recommend that teachers rely upon these as a way of getting started with Foresee instruction. We do not mean to suggest, however, that original lessons should be excluded from Foresee units. The basic framework above can generally be "fleshed out" with original lessons that do not utilize our five techniques, although these lessons should attempt to follow Foresee principles as far as possible. That is, they should include objectives of all three types (content, language, and learning strategies), make use of suitable materials, follow the five-stage format, etc. Chapter 4 contains some examples of original Foresee lessons, including a creative writing lesson (Lesson 8), a lesson on subtracting positive and negative integers (Lesson 14), a lesson on telephone weather forecasts (Lesson 15), and a lesson on writing haiku (Lesson 16).

Nothing more needs to be said at this point about the structure of Foresee units. The sample unit in the following chapter will serve to elucidate the process of unit construction far better than any further description we might attempt here. The reader is advised to study this sample unit very carefully and to take special note of the sequential organization of lessons, their variety, and their dependence upon materials.

To conclude, the synthesis of theory, materials and procedures that comprises the Foresee application process terminates in the reality of effective classroom instruction. The theory generates the objectives, materials provide the concrete resources, and explicit procedures assist in the designing of effective and innovative lessons and units. The positive and exciting learning environments that result are vital in ensuring the success of our classroom practices and — ultimately — of our students as they aspire to higher academic goals.

Chapter 4

Sample Unit: The Weather

Chapter 4

Sample Unit: The Weather

Introduction

The purpose of this chapter, which consists of one sample Foresee unit containing 16 sequenced lesson plans, is to illustrate the processes of Foresee **lesson and unit planning** described in general terms in Chapter 3. This sample unit is designed for an "all ESL" class at the secondary level (grades 7-senior 4) where the instructional goal is to develop ESL students' **academic English** and **proficiency in using learning strategies** through involvement in content-area work. To use the term introduced on the first page of Chapter 1, it is an example of **content-based language instruction** in a secondary ESL classroom setting.

Despite this stated focus, there is no reason why many of the lessons described in this chapter could not be used in mainstream classrooms containing ESL students. It is likely, however, that most of these lessons would have to be revised somewhat to suit the needs of "mixed" classes containing sizeable numbers of English-speaking students, for reasons discussed at the beginning of Chapter 5. That next chapter deals specifically, in fact, with the application of Foresee in regular classrooms at the secondary level. It focuses, then, on **language-sensitive content instruction**, to recall another term introduced in Chapter 1. Chapter 5 can thus be regarded as a natural complement to the present chapter, completing the picture of Foresee application by explaining how elements of our approach might be adapted to the mainstream context.

The present chapter, as noted, aims to illustrate the processes of planning Foresee lessons and units in sheltered ESL settings. Secondary ESL teachers can make use of this sample unit in several different ways. First of all, they could simply use it — as is — as a teaching unit for their ESL classes. Although it was never our intention to produce a "cookbook" style sourcebook amply stocked with convenient recipes to be followed, we admit that the implementation of this chapter in such a fashion would have one major benefit: it would thoroughly familiarize teachers with the Foresee planning process and help them learn — through guided practice — exactly how our approach works. With this background, they would then be in a good position to begin developing their own original Foresee units for classroom use. Needless to say, however, it is not actually necessary to teach this unit in a real classroom in order to learn from it. Whether one implements it or simply reads it, the ultimate goal to which one aspires should be the same, namely to master the intricacies of the Foresee application process to the point where one becomes empowered to teach ESL students in a new, exciting, and highly effective way — the Foresee way.

There are a number of reasons why the theme we have chosen, the weather, is appropriate for an illustrative unit at the secondary level. First, weather is a topic that is not restricted to any particular grade level. ESL students at either the junior or senior high level can profit from the study of weather. (Looking ahead to the proposed reorganization of our schools into an early, middle, and senior years arrangement, this unit will be appropriate for the middle and senior years levels.) Second, the weather is something that every student is familiar with, and teachers should therefore find it rather easy to relate many of its central concepts to students' past experiences. A third good reason is that many aspects of weather are quite interesting. Fourth, the topic is a very broad one that offers opportunities for integrating a number of academic subject areas, including science, geography, language arts, and mathematics, into the unit. And finally, weather is a content-area topic that is rich in possibilities for developing students' linguistic knowledge and academic language skills.

One problem we faced in designing this unit was that of adjusting our instructional expectations to a suitable level. The secondary level spans six grades, and it has been difficult to produce a "generic" unit that avoids being biased towards the teaching of students of some particular age or proficiency in English. Nevertheless, we have tried to steer a middle course here, and although we admit that some of the following material might be too simple for advanced senior high ESL students or too difficult for lower-intermediate junior high students, we are confident that the unit succeeds **as an illustration** of Foresee application principles. There is absolutely no reason why individual lessons cannot be modified to suit the abilities of particular classes, and teachers who wish to implement this unit are encouraged to make appropriate changes wherever necessary. The subject matter itself is not all that important in content-based language instruction; what counts most is keeping to the spirit of Foresee by utilizing the content as a vehicle for teaching academic language and learning strategies.

Should modification of this unit turn out to be necessary, teachers can go about the task in a variety of ways. Most obviously, the subject matter of individual lessons can be simplified or made more complex, whichever is appropriate. Another possibility would be to break up some of the longer lessons into shorter ones that are more suitable for students with lower proficiency in English. We should mention at this point that we have used the word "lesson" rather loosely in designing this unit. A few of these so-called lessons can certainly be covered in a single class period of 45-50 minutes in length, but most of them probably require several sequential class periods to complete. One easy way of simplifying these lessons, then, would be to "stretch them out" so that the material is taught more slowly over a greater length of time. Finally, some of the lessons included in this unit can simply be omitted if there is not enough time to cover them. The unit itself is a rather loosely designed structure, and would not suffer in effectiveness if some of its parts were deleted.

In conclusion, we hope that the reader will find this chapter to be a worthwhile one. We do not pretend that it makes easy reading, and no doubt it will take some time to plod through all of it. We are convinced, however, that making a determined effort to do so will ultimately prove very rewarding, as this sample unit is really the best route (on paper at least) to understanding the Foresee application process. We urge the reader to refer again to Figure 3.1 in Chapter 3, and to pay special attention — when reading through this chapter — to the various aspects of lesson and unit planning encapsulated in that diagram. Four in particular are of crucial importance.

1. The inclusion of multiple lesson **objectives**, as guided by the Foresee theoretical model described in Chapter 1. Notice in particular how the subject matter of each lesson is used as the vehicle for accomplishing specific language objectives (language skills, vocabulary, structures, discourse features, and academic language functions) and learning strategies objectives.

2. The way in which **materials** are used as the basis of Foresee lessons. In implementing Foresee, there is no need to rely on elaborate materials, expensive textbooks, special ESL series, student workbooks, etc. Teachers can use easy-to-find pictures, passages from books, newspaper clippings, and the like.

3. The specific application of the **five Foresee lesson techniques** that were described in Chapter 3. Some of these are utilized several times in the unit. Here is a summary of their application:

   - Text Questioning Technique (TQT) — Lessons 1, 3, 9
   - Research Technique — Lesson 12
   - Presentations Technique — Lesson 13
   - Dictated Instructions Technique (DIT) — Lessons 2, 6, 10, 11
   - T-list Procedure — Lessons 5, 7, 15

   Lessons 4, 8, 14, and 16 are original lessons that do not utilize any particular Foresee techniques.

4. The process of Foresee **unit development**, described at the end of Chapter 3. This unit is:

    - **theme-based** — it centres around the topic of weather, which is used as a general unifying concept;
    - **integrated** — it includes lessons on science, geography, language arts, and mathematics; and
    - **facilitated** (in the true sense of the word, made easier to plan) **through the use of the five Foresee lesson techniques**.

Learning Logs

In order to give students an opportunity to evaluate their own understanding as they progress through this unit, and also to promote feelings of self-satisfaction about their learning, we have included three **learning logs** in the unit. These are inserted at roughly equal distances apart, and cover the material in the lessons preceding them, as follows.

(1) Learning Log after Lesson 5 — covers material in Lessons 1-5
(2) Learning Log after Lesson 11 — covers material in Lessons 6-11
(3) Learning Log after Lesson 16 — covers material in Lessons 12-16

These learning logs are modeled after those in Chamot, O'Malley, and Küpper's (1992) series *Building Bridges: Content and Learning Strategies for ESL* (see the reference at the end of Chapter 2). Our learning logs can be photocopied (after revision, if necessary) and distributed to the students at suitable points in the unit. The students can complete them by checking off the items they recall, asking the teacher for clarification or assistance in remembering items that are not immediately recognizable to them.

A Word about Learning Strategies Notation

Because the teaching of learning strategies is so important in the Foresee Approach, we have followed some special layout conventions in this unit to help the reader recognize these strategies whenever they occur in the text.

1. Except when the learning strategies are named as part of the actual text, they are usually **italicized** and placed in **square brackets**, e.g., *[Self-evaluation]*, *[Imagery]*, *[Cooperation]*. We have used the exact names for the strategies proposed by Chamot & O'Malley (1987); see Chapter 1 (pages 36-37) for a complete list.
2. **Metacognitive strategies** are generally listed on the **left** side of the page, **cognitive strategies** are listed in the **middle** of the page, and **social-affective** strategies are listed on the **right** side of the page. Example:

[Self-evaluation] *[Grouping]* *[Cooperation]*
[Resourcing]

3. Whenever the teaching of a strategy in some way or other is **about to be explained** (that is, the explanation will appear beneath the naming of the strategy), **a pair of hyphens follows the strategy name**. Example:

   [Resourcing]--

   This means that the teaching of this strategy is about to be discussed, or that the following activity will involve the use of this strategy in some way.

4. In contrast, when **no hyphens** occur after the naming of a strategy, this generally means that the use of the strategy has occurred in the **previously discussed** activity, explanation, or whatever. Example:

   [Resourcing]

   This means that resourcing has been used in the activity that has just been explained.

A full appreciation of the lessons in this unit depends heavily on the reader's understanding of all the learning strategies discussed in Chapter 1 (see pages 33-38). An intensive review of these strategies is therefore recommended as an extremely useful preparation for the reading of this unit.

Deduction/induction

One learning strategy which often proves puzzling to teachers learning our approach is the cognitive strategy of **Deduction/induction**. We therefore include a special explanation of this strategy in these introductory remarks.

Chamot & O'Malley (1987) characterize this strategy as follows:

> Applying rules to understand or produce the second language, or making up rules based on language analysis.

This strategy pertains, then, to language learners' conscious attention to the **grammatical structures** of the target language, with particular emphasis on the use of **linguistic rules** to assist in the production or comprehension of structures. The deliberate application of a rule already known by the students is normally called the **deductive approach**, or simply **deduction**. The "making up" of rules on the basis of linguistic evidence, on the other hand, is called **induction**; students can often induce rules from the language samples they see and hear, *especially when they are given proper guidance in seeking out these rules.*

In our lessons employing the Dictated Instructions Technique (DIT), for example, students are required to convert sentences from imperative form to the passive voice. To illustrate, they might have to change sentence 1 below to sentence 2:

(1) Put the thermometer into the first beaker.
(2) The thermometer was put into the first beaker.

Their ability to perform this transformation might be based upon explicit grammatical knowledge acquired earlier in the lesson or in some previous lesson **(deduction)**. Alternatively, they might make use of other examples prior to this one as evidence for the formation of the rule by themselves **(induction)**.

Throughout this chapter, then, mention of the strategy *[Deduction/induction]* invariably pertains to the analysis of grammatical forms or structures, either deductively or inductively.

Summary of Lessons: The Weather

The following outline of the 16 lessons in this unit is intended as a convenient reference for teachers who need to determine the contents of individual lessons in a hurry. In most cases we include information about the **lesson topic**, the **subject areas** integrated into the lesson, and the **Foresee lesson technique** used in the lesson (if there is one). Comprehensive information about the content, language, and learning strategies objectives of these lessons can be found on the first few pages of each of the lesson descriptions themselves.

Lesson 1: Introductory Lesson on the Weather
(Text Questioning Technique)

Lesson 2: Temperature Experiment - Science
(Dictated Instructions Technique)

Lesson 3: The Water Cycle - Science, Geography
(Text Questioning Technique)

Lesson 4: The Water Cycle Completed - Language Arts
(Drawing a Graphic Representation, Reporting)

Lesson 5: Clouds - Science, Language Arts
(T-List Procedure)

Learning Log, Lessons 1-5

Lesson 6: Hygrometer Experiment - Science
(Dictated Instructions Technique)

Lesson 7: Forms of Precipitation - Science, Geography, Language Arts
(T-List Procedure)

Lesson 8: Creative Writing - Language Arts

Lesson 9: The Wind Cycle - Science, Language Arts
(Text Questioning Technique)

Lesson 10: Barometer Experiment - Science
(Dictated Instructions Technique)

Lesson 11: Acid Rain Experiment - Science
(Dictated Instructions Technique)

Learning Log, Lessons 6-11

Lesson 12: Weather Systems Research - Science, Geography, Language Arts
(Research Technique)

Lesson 13: Weather Systems Presentations - Science, Geography, Language Arts
(Presentations Technique)

Lesson 14: Subtraction of Integers - Mathematics, Geography

Lesson 15: Telephone Weather Reports - Science, Geography, Mathematics
(T-List Procedure)

Lesson 16: Weather Haiku - Language Arts

Learning Log, Lessons 12-16

Lesson 1: Introductory Lesson on the Weather (Text Questioning Technique)

Objectives:

Content Objectives:

- To learn about the important parts of a weather report
- To learn about weather forecasting

Language Objectives:

Skills:

- Listening - to note take; in group discussions
- Speaking - to compare and correct answers in group discussions
- Reading - a weather report; for specific information to verify answers to questions
- Writing - to complete declarative sentences in answer to questions

Linguistic Knowledge:

Vocabulary Development:

weather, condition, atmosphere, weather report, predict, forecast (noun & verb), include, exclude, information, kind, temperature, degrees Celsius, above zero (plus), below zero (minus), low, high, wind, calm, windy, windchill, sky, clear, sunny, cloudy, containing, mainly, rainfall, snowfall, precipitation, flurry, scattered, occasional, blizzard, rise, set, newspaper clippings, stand for, details, define, definition, term, thermometer, instrument, meteorologist, layer

Structures:

- Present tense to express habitual behavior or conditions
- Subject-verb agreement
- Passive voice (e.g., *is called, is measured*)
- Declarative sentence form
- Pluralization of nouns (e.g., *flurry-flurries*)
- Frequency adverbs (*always, usually, often, sometimes*) and their position in sentences
- "If" clauses used to express conditions
- Noun suffix *-tion*; verb suffix *-ing*

Discourse Features:

- Discourse markers: *however, in other words, in contrast, both, also*
- Sequence markers: *first, second, third, fourth, finally*
- Theme-rheme structure
- Paragraph unity

Functions:

- Reporting text-based information by writing declarative sentences
- Defining (both the regular and "is called" patterns)

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Prediction - guessing what the article is about
- Inferencing - making guesses about content during discussions and note taking
- Imagery - using the visuals on the newspaper weather forecasts
- Note taking - when listening to the dictation of the article
- Deduction/induction - when expanding notes into complete sentences
- Auditory representation - repeating words and phrases mentally while taking notes
- Resourcing - using newspaper clippings (short weather reports)

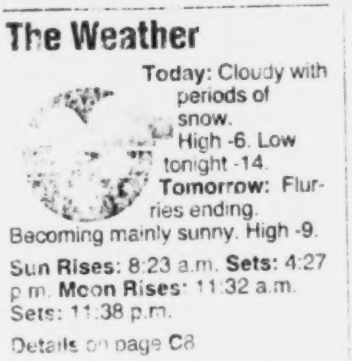
Social-Affective Strategies:

- Cooperation, Questioning for clarification

Materials:

- A sheet of visuals about the weather — one week of weather reports from newspapers (see page 91). Note that the samples given here were taken from a sequence of December issues of the *Winnipeg Free Press*, so naturally they indicate cold weather, snow, etc. If spring, summer, or fall conditions were reported, the teacher would have to make some adjustments to the objectives (especially vocabulary) and procedures sections of this lesson.
- A written text (article) about the weather (see page 92).
- A list of questions about the written text (see the Presentation stage for this list).

The Weather -- VISUALS

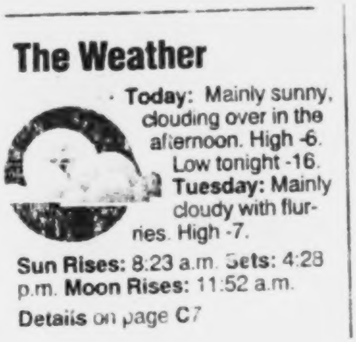


The Weather

Today: Cloudy with periods of snow. High -6. Low tonight -14. **Tomorrow:** Flurries ending. Becoming mainly sunny. High -9.

Sun Rises: 8:23 a.m. **Sets:** 4:27 p.m. **Moon Rises:** 11:32 a.m. **Sets:** 11:38 p.m.

Details on page C8

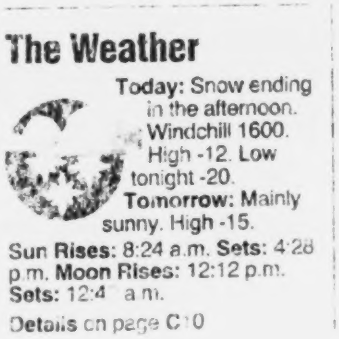


The Weather

Today: Mainly sunny, clouding over in the afternoon. High -6. Low tonight -16. **Tuesday:** Mainly cloudy with flurries. High -7.

Sun Rises: 8:23 a.m. **Sets:** 4:28 p.m. **Moon Rises:** 11:52 a.m.

Details on page C7

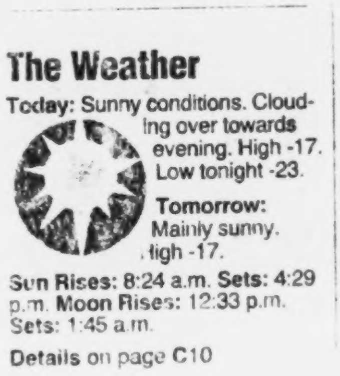


The Weather

Today: Snow ending in the afternoon. Windchill 1600. High -12. Low tonight -20. **Tomorrow:** Mainly sunny. High -15.

Sun Rises: 8:24 a.m. **Sets:** 4:28 p.m. **Moon Rises:** 12:12 p.m. **Sets:** 12:4[illegible] a.m.

Details on page C10



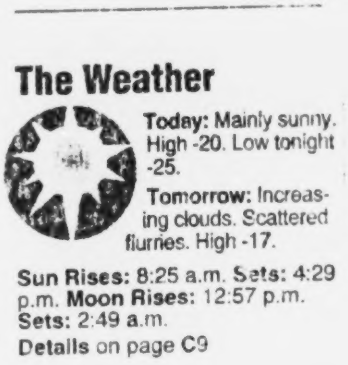
The Weather

Today: Sunny conditions. Clouding over towards evening. High -17. Low tonight -23.

Tomorrow: Mainly sunny. High -17.

Sun Rises: 8:24 a.m. **Sets:** 4:29 p.m. **Moon Rises:** 12:33 p.m. **Sets:** 1:45 a.m.

Details on page C10



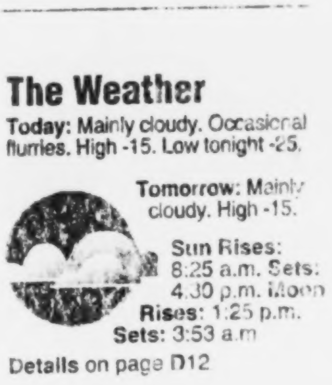
The Weather

Today: Mainly sunny. High -20. Low tonight -25.

Tomorrow: Increasing clouds. Scattered flurries. High -17.

Sun Rises: 8:25 a.m. **Sets:** 4:29 p.m. **Moon Rises:** 12:57 p.m. **Sets:** 2:49 a.m.

Details on page C9



The Weather

Today: Mainly cloudy. Occasional flurries. High -15. Low tonight -25.

Tomorrow: Mainly cloudy. High -15.

Sun Rises: 8:25 a.m. **Sets:** 4:30 p.m. **Moon Rises:** 1:25 p.m. **Sets:** 3:53 a.m.

Details on page D12

Excerpted from the *Winnipeg Free Press*, Dec. 19-24, 1993, and reprinted with permission from Weather Technical Services, Winnipeg, MB.

The Weather

Weather is the condition of the atmosphere. A description of the weather is called a **weather report**. Because weather reports usually try to predict the weather in the future, both today and tomorrow, they are sometimes called **forecasts**. To forecast means to predict. A weather report or forecast usually includes information about five things.

The first is the **temperature**, which tells us if it is hot or cold outside. Temperature is measured in degrees Celsius, for example, 18 degrees Celsius (18°C). However, weather reports often exclude the "degrees Celsius" part because it is easier just to say, for example, that the temperature is 18. In the summer, the temperature is always above zero, or plus — for example, +20 or just 20. In the winter, the temperature in Winnipeg is usually below zero, or minus — for example, -17. Weather reports often try to forecast the low temperature tonight and the high temperature tomorrow.

The second kind of information in a weather report is the speed of the **wind**, in other words, how fast the air is moving. Moving air is called wind. However, weather reports do not always include this information. If there is no wind, we say it is **calm** outside. If there is a lot of wind, we say it is **windy**. If it is both cold and windy outside, it often feels *very, very* cold. Weather reports sometimes include a **windchill** number which helps people understand how cold it really feels.

The third kind of information in a weather report is the condition of the **sky**. A sky containing no clouds is called a **clear** or **sunny** sky. In contrast, a sky containing many clouds is called a **cloudy** sky. If the sky is more cloudy than sunny, we say it is "mainly cloudy."

Fourth, a weather report often includes information about **rainfall** or **snowfall**, in other words, how much rain or snow will fall from the sky. Rainfall and snowfall are also called **precipitation**. A short, light snowfall is called a **flurry**. A long, heavy snowfall is called a **blizzard**. Blizzards are often accompanied by strong winds.

Finally, a weather report often includes the times when both the sun and moon will **rise** and **set**. However, this information is not really part of the weather.

Procedures:

Note: This lesson utilizes the **Text Questioning Technique (TQT)** described in Chapter 3.

I. PREPARATION - Brainstorming

1. Give the students each a copy of the sheet of visuals (weather reports from the newspaper) and a copy of the weather article. Tell them to turn the article over and look at the visuals for one minute. By examining the title, headings, and pictures, they are to guess or predict what they think the accompanying article is about. [**Note:** Because the text and accompanying visuals are often in a textbook or other book, the standard version of the TQT advises that both text and visuals be distributed to the students at the same time. This is the preferable procedure, as one of the purposes of this entire activity is to encourage students to make use of *all* the information accompanying a written text — pictures, graphics, headings, etc. — to help them predict and understand the content. However, it is not absolutely necessary to give out the visuals and text at the same time. There is sometimes a danger in this, as the students may be inclined to look at the written passage at times they should not be. If you wish, then, you may distribute the visuals first. The written text can be passed out at the appropriate time, namely in step 9 of the procedure in the Practice phase (see below).]

2. After one minute, the students write down their predictions. Spelling and sentence structure (syntax) are not important at this time.

[Advance organization] *[Prediction/inferencing]*
[Imagery]

3. Listen to each student's prediction. Write the key words (vocabulary) on the board or overhead transparency. E.g., weather, sun, clouds, today, tomorrow, moon, rises, sets.

Strategy Instruction: Developmental Questions

[Advance organization]--

- These are called newspaper clippings. What do they tell us about? (the weather)
- How do you know that? (the titles)
- What do you think the article is going to be about? (the weather)
- What is weather? (condition of the air around us, outside)
- What does "condition" mean? (what it is like, how it looks or feels)
- What is another name for the air around us? (the atmosphere)
- How did you get the words "today" and "tomorrow"? (headings)
- How do you know they are headings? (darker and thicker print)
- How does the print in the title differ from the print in the headings? (print in the title is bigger and thicker)
- Why? (because the title describes the whole clipping)
- What do the headings describe? (a few lines)

- How many titles are there? (one)
- How many headings? Count them. (seven)
- What are the headings? ("Today, Tomorrow, Sun Rises, Sets, Moon Rises, Sets, Details")
- What does the heading "Today" stand for? (today's weather)
- What does the heading "Tomorrow" stand for? (tomorrow's weather)
- What does "Sun Rises" mean? (when the sun comes up)
- What does "Sets" mean? (when the sun goes down)
- What about "Moon Rises" and "Sets"? (when the moon comes up and goes down)
- What does "Details" mean? (more information on another page)
- Do all of these headings describe the title, "The Weather"? (yes)
- Does looking at these clippings **in advance** (before you read the article) help you to **organize** your thoughts so that you can better understand what you read? (yes)
- This learning strategy is called **Advance organization**. It means looking over the title, headings, and pictures before you read the article. [At this point the students may add this strategy to their blue sheets.]

[Imagery]--

- How did you get the words "clouds," "sun," and "snow"? (from the pictures)
- Do the pictures show the weather today or tomorrow? (today)
- What do the pictures describe? (the weather for today, which is also written beside "Today")
- Do the pictures help you understand the weather? (yes)
- What strategy are you using when you look at the pictures for information? (using images and pictures — **Imagery**)
- What kind of strategy is this? (cognitive) [At this point the students may add the word "Imagery" to their green sheets, beside the words "Using images and pictures."]

4. Tell the students to look at the weather clippings again. Discuss the information under the headings in further detail, asking questions to elicit more vocabulary through brainstorming. Write this additional vocabulary on the board or transparency. If necessary, tell them (and write down) important words which are not in the visuals but which appear in the reading text, e.g., *atmosphere, weather report, forecast, temperature, degrees Celsius, wind, calm, windy, snowfall, precipitation, include, exclude, accompanied by*. Certain discourse markers should also be listed here, e.g., *in other words, in contrast*. The meanings of some of these words can be demonstrated by reference to the clippings; e.g., the high *temperature* tomorrow will be -9 *degrees Celsius*; snow is a kind of *precipitation*, like rain. Other terms can be defined or clarified through general discussion; e.g., *wind, windy, calm*.

   When this discussion is completed, the students will have all the vocabulary necessary to understand the article, before they even read it. These words should be left on the board (or transparency) during the Presentation stage, to assist the students in answering the questions that will be posed to them.

[Selective attention] *[Inferencing]*
[Imagery]
[Resourcing]

II. PRESENTATION - Listening

5. Tell the students to **turn over** their articles (i.e., place them face down on their desks). Show them a list of questions about the article, either on the board (previously concealed) or on the overhead. Instruct the students to read the questions silently to themselves.

****

QUESTION LIST

Note: The answers, given in italics here, are not included in the list shown to the students.

1. What is weather? *the condition of the atmosphere*
2. What is a description of the weather called? *a weather report*
3. What are weather reports sometimes called? *forecasts*
4. How many kinds of information does a weather report usually include? 5
5. What information tells us if it is hot or cold outside? *the temperature*
6. What is temperature measured in? *degrees Celsius*
7. Which two temperatures does a weather report try to forecast? *low tonight and high tomorrow*
8. What is moving air called? *wind*
9. What is the second kind of information in a weather report? *the speed of the wind*
10. What does "calm" mean? *no wind*
11. What number helps people understand how cold it really feels? *windchill*
12. What is a sky containing no clouds called? *a clear or sunny sky*
13. What is a sky containing many clouds called? *a cloudy sky*
14. What are rainfall and snowfall called? *precipitation*
15. What is a short, light snowfall called? *a flurry*
16. What is a long, heavy snowfall called? *a blizzard*
17. What are blizzards often accompanied by? *strong winds*
18. What does a weather report sometimes tell about the sun and moon? *the time they will rise and set*

****

Now go through the questions with the students, reading them aloud and reviewing all vocabulary the students do not understand. Making use of their suggestions as far as possible, underline in each question (using a different colour chalk or transparency marker) the most important word or words that the students will be listening for during note taking.

E.g.: 1. What is weather?

[Selective attention]

6. The students number their papers 1-18 down the left-hand side. Discuss note-taking strategies with them, e.g., how to use letters or parts of words to stand for longer words.

[Organizational planning]

7. Dictate the article fairly slowly. The students listen carefully for the answers to the questions, writing down the answers (one or two words, or suitable abbreviations) as they hear them, beside the appropriate numbers. Spelling is not important at this time.

[Self-monitoring]

[Note taking]
[Inferencing]
[Auditory representation]

8. Dictate the story or article more rapidly, allowing the students the opportunity to complete their answer list or to check their answers. If necessary, reread the article a third time.

[Self-monitoring]

[Inferencing]
[Auditory representation]

III. PRACTICE - Speaking and Reading

9. The students work in pairs or groups, discussing and comparing their answers. At this point they expand the abbreviations they have written during the note taking phase into full words or phrases. Then instruct them to turn their articles face up in order to correct:

   a) **Answers** - by comparing their answers with those of their partner or group, and by checking against the article itself.

   b) **Spelling** - checking their answers against the article.

   Assign a set time limit (e.g., 10 minutes) for this task. While the students are comparing and correcting, circulate to give assistance when needed or requested.

[Self-evaluation]

[Elaboration]

[Cooperation]
[Questioning for clarification]

IV. EVALUATION

10. Tell the students to **turn over** their articles (i.e., place them face down). Elicit from the students the answers to the questions on the board or transparency, writing them beside the questions in a different colour chalk or felt pen. (It is a good idea to use the same colour as you used in step 5 to underline the key words in the questions.) E.g.:

    1. What is weather? *the condition of the atmosphere*

    The question and answer are in different colours, the answer and underlining in the same colour.

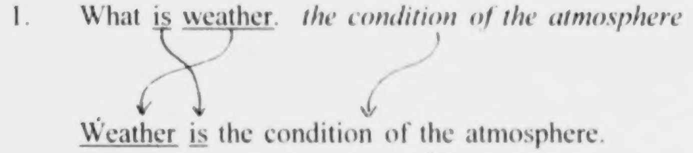
V. FOLLOW-UP I - Writing

11. The articles remain **face down**. Instruct the students to complete the exercise individually, this time writing the answers in complete sentences. At this point, teach them how to write a complete sentence using most of the words in the question and the answer beside the question. [**Note:** It may be advisable to collect the articles at this point, as the students may be inclined to glance at them when writing the full-sentence answers required at this stage.]

[Deduction/induction]--

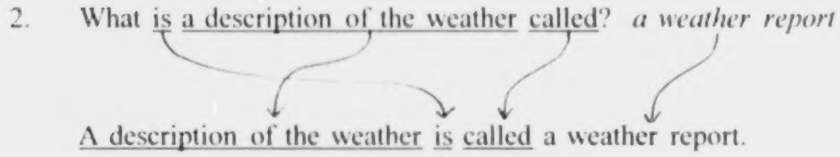
Ask:

- What words from the question are you going to use in your answer? [The key words will already be underlined in the same colour as the answer. Underline other words they can use in their answers in the same colour.]
- Now write the answer in a sentence, using the underlined words and the answer. [Draw arrows from the underlined words and answer, to indicate the correct sentence order.] E.g.:



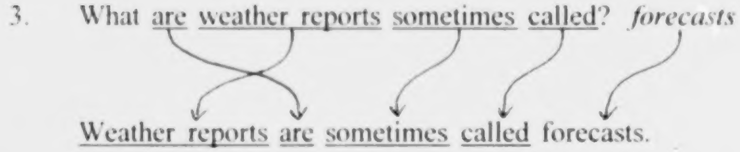
1. What is weather. *the condition of the atmosphere*

Weather is the condition of the atmosphere.



2. What is a description of the weather called? *a weather report*

A description of the weather is called a weather report.



3. What are weather reports sometimes called? *forecasts*

Weather reports are sometimes called forecasts.

Subject-verb Agreement:

Ask:

- When do you use "is" in a sentence?
- When do you use "are"?
- What rule could we make up?

  is = 1
  are = 2 or more

- In the first answer above (the answer to question 1), did we use "is" or "are"? (is)
- Why? ("weather" is one thing — singular)
- In the second answer above (the answer to question 2), did we use "is" or "are"? (is)
- Why? (only one description — "a description")
- In the third answer above (the answer to question 3), did we use "is" or "are"? (are)
- Why? (more than one thing — "weather reports")
- What is the last letter in "weather reports"? (s)
- If there is an "s" at the end of a word, is it singular or plural? (plural)
- When we talk about a snow flurry, is "flurry" singular or plural? (singular) What is the plural? ("flurries") Do we spell it like this: "flurrys"? (no) What must we do when the word ends in "y"? (change the "y" to "ie") The result would be spelled like this: "flurries."

Frequency Adverbs:

- Look at question 3 again:

  3. What are weather reports sometimes called? *forecasts*

- The word "sometimes" tells **how often** something happens. Can you find any other words like this in the question list? (yes, in numbers 4 and 17)

  4. How many kinds of information does a weather report **usually** include? *5*
  17. What are blizzards **often** accompanied by? *strong winds*

- Words like "sometimes," "usually," and "often" are called **adverbs of frequency**, or **frequency adverbs**. What is a frequency adverb that tells us something happens all the time? ("always")
  E.g.: In summer, the temperature is always above zero.

- Let's make a list of these frequency adverbs, in the order "most often" to "least often." Let's write them in a column:

  always
  usually
  often
  sometimes

- Look at questions 3, 4, and 17 again. Where do these frequency adverbs appear in these questions? (just before the main verb)
- Look at the answer to number 3 again:

  Weather reports are sometimes called forecasts.

- Where does the frequency adverb "sometimes" appear in this answer? (just before the main verb)
- Follow this rule when writing the answers to questions 4 and 17.

Note: The "rule of thumb" given here is adequate for pedagogical purposes, but it is not correct for all cases. The actual rule is as follows. In declarative sentences, the frequency adverb:

a) follows the first auxiliary, if there is one (e.g., *Winnipeg has often been called the "gateway to the west"*);
b) follows the verb "to be," if it is the main verb (e.g., *John is always late*);
c) immediately precedes any main verb other than "to be," if there is no auxiliary in the sentence (e.g., *The sun always rises in the east*).

In questions (wh- or yes-no), the frequency adverb directly follows the subject of the sentence, which is inserted immediately after the first auxiliary, the main verb "to be," or the appropriate form of "do" (change examples a, b, and c above to questions to observe this).

Other Structures:

The reading passage contains other important structures which the teacher may wish to discuss. Among these are:

- The use of the present tense to express habitual behavior or conditions
- The passive voice (e.g., *is called, is measured, are accompanied by*)
- "If" clauses used to express conditions (e.g., *If there is a lot of wind, we say it is windy.*)

However, we ignore these structures here. It is not really necessary to provide explicit instruction about *every* structure in a passage. For one thing, too much instruction of this type would be extremely time consuming. For another, the students will benefit from simply being exposed to a variety of unanalyzed structures in the **comprehensible input** they receive; see the section on Krashen in Chapter 1.

Discourse Features:

Theme-Rheme Information Structure. By answering the questions in complete sentences, the students are gaining experience in using the theme-rheme format of information organization so common in English discourse. The theme of a sentence is what is being talked about, usually the "given" information in the sentence. The rheme, in contrast, is the "new" information provided about the theme. Usually the theme precedes the rheme. Thus, in writing an answer like "A description of the weather is called a weather report," the students are practising theme-rheme discourse structure, since they are placing the theme (*a description of the weather is called*) at the beginning and the rheme (*a weather report*) at the end.

Other discourse features can be pointed out and discussed at various stages of the lesson, if desired. For example, paragraph unity is clearly demonstrated by the reading passage, in which each paragraph after the introduction deals with a single weather feature. Sequence markers (*first, second,* etc.; *finally*) and other discourse markers can also be discussed and clarified (e.g., *however, in other words, in contrast, both, also*).

12. The students complete their answers individually. Each student then has his or her work edited by a partner (or another group member) before showing it to the teacher.

[Cooperation]

13. The final draft is edited as it is read to the teacher.

[Self-evaluation]

FOLLOW-UP II - Function Instruction: Defining.

The purpose of this additional follow-up section is to promote students' understanding of an important academic language function (ALF), namely **defining**. See Chapter 1 for a detailed explanation of ALFs.

Write on the board:

Weather is the condition of the atmosphere.

Conduct a discussion like the following:

- This sentence tells us what the word "weather" means. In other words, it tells us the **meaning** of "weather."
- Do you know another word for "tell the meaning of"? ("**define**" — students will not likely know this)
- When we write a sentence that tells what a word means, we are **defining** the word.

Write on the board, in a column, the two words:

define
defining

- What do we call a sentence that defines a word, for example, "Weather is the condition of the atmosphere"? It comes from the word "define." (definition)

Write "definition" under "defining" in the column.

- What kind of word is "define"? It is something we **do** — we can **define** a word like "weather." (a verb)
- What kind of word is "definition"? Notice that a definition is a sentence, a **thing**. (a noun)
- Do you know what three letters you can always add to a verb, to make a new word? (point to the second word in the column — "ing") When "ing" can be added to a word, that word must be a verb, isn't that right? (yes)
- Is "forecast" a verb? Can I say, "They forecast the weather in the newspaper every day"? (yes) Is "forecasting" a word, then? (yes) Give me a sentence using "forecasting" as a verb. (e.g., "They are forecasting the weather.")
- The letters "ing" tell you a word is a verb. What letters in "definition" tell you it is a noun? ("tion") Yes, words ending in "tion" are usually nouns. Do you know any other nouns that end in "tion"? What is another word for "country"? (nation) Do you know some more? (e.g., nutrition, condition, immigration, description, explanation, pronunciation)
- The letters "tion" are sometimes added to verbs to make nouns, e.g., "define - definition." What verb does "immigration" come from? (immigrate) What about "description"? (describe) What about "explanation"? (explain) Notice that the verbs may change in other ways as well; e.g., the "e" is dropped in "define" and "describe", b → p in "description," ai → a in "explanation," etc.

Note: We terminate this discussion of verb and noun suffixes at this point. It is actually optional, as it is not crucial to the understanding of the ALF **defining**. However, we have included it here to illustrate how easy it is to take advantage of opportunities like this to teach morphology (i.e., derivations, suffixes, etc.). The topic introduced here could easily be expanded into an entire lesson.

Write on the board, under the "weather" definition, a second definition taken from the students' answer lists:

A description of the weather is called a weather report.

- In the first sentence, what word is defined? ("weather") Where does it appear in the sentence? (at the beginning)
- In the second sentence, what is defined? ("weather report") Where does it appear in the sentence? (at the end)

- When you define a word or several words together, what you define is sometimes called a **term**. What term is defined in the first definition? ("weather") What term is defined in the second definition? ("weather report")

- Here are two different ways of writing a definition.
  (1) If you begin with the term you want to define, you just write "is" followed by what the word means. E.g.:

  Weather is the condition of the atmosphere.

  (2) In contrast, you can **begin** with the meaning of the term you want to define, and **end** with the term itself. But if you do this, you can't put just

the one word "is" between them. You must use two words — what are they? ("is called") E.g.:

A description of the weather is called a weather report.

- Take a look at your answer list. How did you define "forecasts," the first way or the second way? (the second way) Tell me your definition, and I'll write it on the board.

Weather reports are sometimes called forecasts.

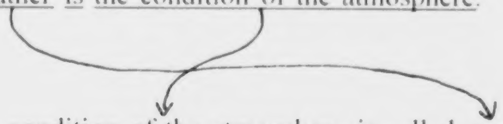
- Do we have "is called" here? (no) Why not? (because "weather reports" is plural — we must use "are called")
- What else do we have in this definition? ("sometimes") We don't usually use this word in definitions, so let's cross it out. Our definition becomes:

Weather reports are called forecasts.

- Which word is defined here? ("forecasts") Notice again that it comes at the end.

- Look at our first definition again. Could we write it in the second way? What would the new definition be? [Use arrows to show how to transform it.]

Weather is the condition of the atmosphere.

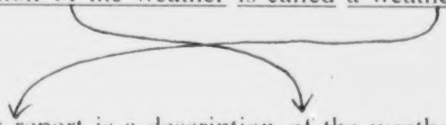


The condition of the atmosphere is called weather.

- Which words do we put between the beginning part and the end part? ("is called") Why not "are called"? ("Condition" is singular.)

- Look at our second definition again. Could we write it the first way? What would the new definition be? [Use arrows to demonstrate the transformation.]

A description of the weather is called a weather report.



A weather report is a description of the weather.

- Do you see how you can change definitions from one kind of sentence to the other? Both ways are good; you should be able to write both kinds of definition.

- **Exercise:** On the next page is a list of definitions. Some of these are ones you have already written, but there are a few new ones also. Some are written in the **first** way (beginning with the word that is defined), while others are written in the **second** way (using *is called* or *are called*). Write each definition in the **opposite way** — that is, change the form of each definition from the first way to the second way **or** from the second way to the first way.

EXERCISE SHEET — DEFINITIONS

1. Moving air is called wind.

2. A sky containing no clouds is called a clear sky.

3. A cloudy sky is a sky containing many clouds.

4. Rainfall and snowfall are called precipitation.

5. A flurry is a short, light snowfall.

6. A long, heavy snowfall is called a blizzard.

7. Flurries that last a short time are called scattered flurries.

8. A thermometer is an instrument for measuring temperature.

9. A person who studies the weather is called a meteorologist.

10. The layer of air around the earth is called the atmosphere.

Lesson 2: Temperature Experiment - Science (Dictated Instructions Technique)

Objectives:

Content Objectives:

- To learn how to perform and report a science experiment incorporating the headings: *Objective, Apparatus, Method, Observations, Conclusion,* and *Diagram*
- To learn how to record and graph observations
- To learn how to draw conclusions based on graphically represented data
- To understand how cold, warm and hot water affect temperature change rates

Language Objectives:

Skills:

- Listening - during discussions; for oral instructions during the note taking phase
- Speaking - to exchange information and assistance
- Reading - their notes, when discussing the experiment method and performing the experiment
- Writing - the various parts of a science experiment report

Linguistic Knowledge:

Vocabulary Development:

apparatus, materials, experiment, objective, observation, conclusion, diagram, chart, bar graph, affect, beaker, beak, spout, thermometer, temperature, degrees, Celsius, Fahrenheit, symbol, °C, °F, ice cubes, boil, boiling water, steam, bubbles, warm water, ice water, check, record, lower, rise/rose, fall/fell, heat, time, colon, personal, impersonal, report, purpose, label, imperative, passive

Structures:

- Imperative forms of verbs
- Infinitive forms of verbs, used when stating objectives
- Irregular past tense forms (*was* and *were*; also *rise/rose, fall/fell*)
- Passive voice
- Past participles
- Subject-verb agreement
- Singular and plural nouns
- Comparative and superlative forms, esp. *most, least, greater, greatest, farther, farthest*
- Punctuation - use of colon when listing, or after headings; use of commas in lists

Discourse Features:

- Sequential markers *first, second, third,* etc.; *last, finally*
- Format of a science experiment report

Functions:

- Stating objectives using infinitive forms
- Listing (apparatus)
- Reporting a science experiment in its entirety

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Resourcing - using weather forecasts and science equipment
- Note taking - of the steps of the method, from dictation
- Predicting - why they are doing the experiment, and what will happen next
- Inferencing - when note taking
- Deduction/induction - when writing the experiment report
- Imagery - using equipment, charts, and graphs
- Elaboration - from notes to full words and sentences
- Transfer - of previous knowledge to performance of this experiment
- Auditory representation - when taking notes
- Grouping - information on a chart
- Summarizing - information on charts and graphs

Social-Affective Strategies:

- Cooperation, Questioning for clarification, Self-talk

Materials:

- Newspaper weather forecasts (new or previously used) for Preparation stage
- For each pair of students:
  - 3 beakers
  - 4 thermometers
  - ice cubes
  - cold water
  - warm water
  - boiling water
  - chart
  - graph paper for line graph

Procedures:

Note: This lesson uses the **Dictated Instructions Technique (DIT)** described in Chapter 3.

I. PREPARATION - Listening and Speaking

Review the weather forecasts from the previous lesson, or show some new ones taken from more recent newspapers. Focus on **temperatures** and the **high** and **low.** Discuss what affects temperatures (e.g., the seasons) and how we measure temperature.

Ask:

- In which season are temperatures the highest? (summer) In which season are temperatures the lowest? (winter)
- Can we say that the seasons **affect** temperatures? (yes) What does "affect" mean? (make a difference, change, make something happen, etc.)
- Yes, when one thing makes something else happen or change, we say it *affects* it.

- What was the high temperature predicted for ______________?
- What does the temperature tell us? (how hot or cold it is)
- What instrument do we use to measure the temperature? (a thermometer) [Show the students a thermometer.]
- What units do we use when measuring temperatures in Canada? (degrees Celsius) [Write "degrees Celsius" on the board.]

- Do you know what the word "symbol" means? In mathematics, "+" is a symbol — it stands for, or represents, something. What is it? (add or plus) How about "X" in mathematics? (multiply or times) Good. A symbol is a short form that represents something else.
- Do you know the symbol for "degrees"? (yes, °) So how can we write "degrees Celsius" in short form? (°C) What is the abbreviation for "Celsius"? ("C")
- Do they measure temperature in °C in the countries you came from? (yes)
- Do you know what units they use to measure temperature in the United States? (degrees Fahrenheit, or °F) What is the abbreviation for "Fahrenheit"? ("F")

- What is the freezing point on a thermometer in °C? (0°C)
- What is the freezing point on a thermometer in °F? (32°F)
- What is the boiling point of water on a Celsius thermometer? Do you know what "boiling" means? It is when the water gets hot enough to bubble, when you heat it. (100°C)
- Do you know the boiling point on a Fahrenheit thermometer? (they likely will not know — 212°F)

- What was the high temperature predicted for ______________?
- What does "high" mean? (the temperature when it is warmest outside)
- What was the "low" predicted for ______________?

- What does "low" mean? (the temperature when it is coldest outside)
- This morning I listened to the weather report on the radio. The high today is going to be ___°C and the low tonight is going to be ___°C. Do we know this for sure? (no) Why not? (they are only predictions)

Show the students 3 beakers, 4 thermometers, ice cubes, cold water, warm water, boiling water, a chart, and some graph paper. Ask:

- What do you think we are going to do today? (a science experiment)

[Organizational planning] *[Predicting/inferencing]*

- Why did you predict a science experiment? (We saw the equipment.)
- What are we going to use in this science experiment? (beakers, thermometers, ice cubes, cold water, warm water, boiling water, a chart, and graph paper)

Note: The students will probably not know the words *beaker, ice cubes, boiling,* etc. Discuss the words they do not know by asking:

- What is this container [hold up a beaker] made of? (glass)
- What does it look like? (a measuring cup)
- How is it the same as a measuring cup? (glass, spout, and measuring marks)
- How is it different from a measuring cup? (no handle and different shape) How is the shape different? (The sides are straight.)
- Is it a good thing that it is made of glass? (yes) Why? (You can see things inside as they are measured.)
- When do you use a measuring cup? (for baking or cooking)
- What is this spout shaped like? (a bird's beak) Yes. It is called a **beaker**.
- When do you use a beaker? (for a science experiment)

- [Hold up some ice cubes.] What are these made of? (water) What do you do to the water to make it a solid like this? (freeze it)
- What do we call frozen water? (ice)
- How is the ice shaped? (in cubes) Yes, these are called **ice cubes**.

- [Pour some boiling water from an electric kettle.] Is this water hot or cold? (hot)
- How do you know? (steam)
- How hot do you think this water is? (100°C) Why? (because there are bubbles in it.) Do you remember the word for this? (boiling)
- When water has a temperature of 100°C and has bubbles and steam coming from it, what do we call it? (boiling water)

When the discussion of the apparatus is completed, hold up the items one by one and ask what they are called. Write the name of each on the board, in a column, as you do this.

Discuss the parts of a science experiment by asking:

- What do you think this experiment is going to be about? (temperature)

- Use a new page of your notebook to begin writing about this experiment. Where should we write the title of this experiment? (at the top of our page) What kind of letters should we use? (capital letters) Why? (title)
- What should the title be? [Entertain suggestions — settle on:] (TEMPERATURE EXPERIMENT)

- What is a word meaning the things we use when we do the experiment, like beakers and thermometers? (equipment)
- Yes. There is a scientific word for equipment. What is it? (apparatus)
- Let's use "apparatus" as a heading. What kind of letter does it start with? (capital "A")
- On the **fifth line** of your page, write the word **Apparatus** followed by the punctuation mark **:** .
- Do you know what this punctuation mark is called? (a colon) When do we use a colon? (when we want to list some things after it)
- Your heading is **Apparatus:**. Now list the materials or equipment you will be using in this experiment. These materials are listed on the board, in a column, but I want you to write them across the page. When you make a list like that, what do you have to remember to put between each item, to keep them separate? (commas) [Demonstrate by writing the first few items for them: *3 beakers, 4 thermometers.*]

- Why do people do science experiments? (to find out things)
- Look at the materials you listed in the apparatus. What do you think we want to find out? (something about the temperatures of cold, warm, and boiling water)
- Yes. We want to find out how quickly temperatures will change in cold, warm, and boiling water.
- Do you remember the word "affect" that we talked about before? (yes) What does it mean? (to make something happen or change)
- Good. We want to find out how cold, warm, and boiling water affect temperature change.
- How would you describe boiling water, using an easy word? (hot) Yes. From now on, let's just call the boiling water "hot water." So what do we want to find out? (how cold, warm, and hot water affect temperature change)

- What will happen to the hot water if we leave it on the desk for a few hours? (It will cool off.)
- What will happen to the warm water? (It will cool off too.)
- What will happen to the temperatures of the hot and warm water? Will they go up or down? (down) Do you know the word "rise"? What does it mean? (go up) Do you know the word "fall"? What does it mean? (go down) Will the temperatures of the hot and warm water **rise** or **fall** [gesture with hands]? (fall)
- So they will change? After 15 minutes, they will be different from what they were at the beginning, isn't that right? (yes)
- Which temperature will change the fastest, the hot water temperature or the warm water temperature? After 15 minutes, which temperature will have changed the most? (varied answers) [Note: At this stage of instruction we are ignoring the formal rule that a comparison between two items should employ the comparative form of adjectives.]

- What about the cold water temperature? Will it go up or down? (up) Why? (It will get warmer.) What is another word for "go up"? (rise) Yes, the temperature of the cold water will rise. So it will change too, right? (yes)
- Will it change faster than the temperature of the hot water? (don't know, or, various guesses) Will it change faster than the temperature of the warm water? (don't know, or, various guesses)
- You don't really know the answers to these questions, for sure, do you? (no) That's OK — you're going to find out. These are the questions that this experiment is going to answer for you. That's the **purpose** of science experiments — they help you find out things you don't know, things you want to find out.

[Predicting]

- There is a word meaning "what we want to find out." It is **objective**. Where should we write the objective of this experiment, before or after the apparatus? (before) Yes, because the objective is the reason we are doing the experiment. The apparatus is just part of the way we do it.
- You left four lines above your apparatus, so you have room on your page. Write **Objective** followed by a colon. This is your heading. Did you use a capital "O"? (yes) Why? (heading)
- Do you know another word meaning "find out"? (discover)
- We want to find out, or discover, how cold, warm, and hot water will affect temperature change. We usually do this using the infinitive form of the verb, as follows. [Write on the board:]

Objective: To discover how cold, warm, and hot water will affect temperature change.

- Copy this objective after your heading **Objective:**.

- We have the **objective** and **apparatus** as parts of our science experiment. What are the other parts? [The students may or may not be familiar with the academic language of *method, observation,* and *conclusion.*]

- What is the next part of the experiment? (what we do)
- What is the word for the things we do? (directions or instructions)
- What is the scientific word for directions or instructions? (method)
- After your apparatus section, write the heading **Method** followed by a colon. We will complete this section later.

- As you do the experiment, you will see things or observe things happening. The name of the next part of the experiment comes from the word "observe." Can you guess what it is? (observation)
- Yes, but we usually write "observations" instead? Why? (because we will see more than one thing) Yes, you may observe many things.
- We won't write the heading **Observations:** yet, because we still have to fill in the method. We can add it later.

- What will you find out at the end of the experiment? (how cold, warm, and hot water affected temperature changes)

- We call this part the **Conclusion**. Do you know the root word of "conclusion"? (conclude) Yes, "conclude" is the verb and "conclusion" is the noun. What does "conclude" mean? (to come to the end) Yes: when you finish something, you conclude it.
- Where should you write the conclusion of your experiment? (at the end) Yes, so we won't write it yet. What do we have to write first? (the method and observations)

[Advance organization]	*[Deduction/induction]*
[Selective attention]	*[Imagery]*
	[Inferencing]

II. PRESENTATION - Listening

The basic procedure in this stage is the dictation of the experimental method to the students. Discourse markers like *first, second, third,* etc. will assist the students in taking notes on the various steps. Discuss the procedure with the students before the dictation by writing the numbers of the steps on the board or transparency after the heading, as follows.

Method:

1.
2.
3.
4.
5.
6.
7.

Strategy Instruction:

[Organizational planning]--
[Selective attention]--

Ask:

- How many steps are we going to do in this experiment? (7)
- How do you know? (There are 7 numbers.)
- Are there any instructions here? (no)
- How will you know what to do? (You will tell us.)
- Yes, I will read out or **dictate** the instructions to you. What will you do as I dictate the instructions? (take notes)
- How will you know when I am reading step number 1? (You'll say "first.") Will you write the word "first"? (no) Why not? (We don't have to — the number "1" means "first.")
- How will you know when I am reading step number 2? (You'll say "second.")
- What will I say for steps 3, 4, 5, and 6? ("third," "fourth," "fifth," and "sixth")
- Because step 7 is the last one, what might I say besides "seventh"? ("last" or "finally")

- Good. Be sure to pay special attention to these words.

[Selective attention]

Instruct the students to list the numbers 1-7 down the left side of **a separate piece of paper**. **Note:** This is **not** yet part of their experiment report; the dictated sentences will later be changed to the passive voice, and the revised sentences will be recorded in their experiment reports.

[Note taking]--

- When you take notes as I dictate, what will you write? (what you say)
- What if you don't know how to spell the words? What will you do? (write part of a word or the first letter)
- What would you write for the word "thermometer"? ("th" or "ther")
- Would you remember what "th" or "ther" stands for later when you are working in your groups? (yes)
- Who are the notes for? (us)

Dictate the method (see below) in the imperative, using the discourse cues of *first, second, third, . . . ,* and *finally*. Read fairly slowly, allowing the students time to take notes.

Note: The following experiment was adapted from Santillana *Bridge to Communication, Middle Level C, Teacher's Guide*, p. 214 (see references listed at the end of Chapter 2).

******************************* **

METHOD

Note: Do **not** dictate the step numbers to the students; dictate *first, second,* etc. instead. The students do not write the ordinal numbers *first, second,* etc., as they already have the cardinal numbers 1 - 7 written on their papers.

1. First, fill one beaker with cold water.
2. Second, fill one beaker with warm water.
3. Third, fill one beaker with hot water.
4. Fourth, put one thermometer in each beaker and leave one out in the air.
5. Fifth, check the thermometers at the beginning and every 3 minutes for 15 minutes.
6. Sixth, record the temperatures on a chart.
7. Finally, graph the temperatures on a bar graph.

******************************* **

Strategy Instruction:

[Self-monitoring]--

Ask:

- How did you do? Did you get all the notes?
- Do you want me to read it again? (yes)
- What should you listen for this time? (what we don't have)

Read the method again, and a third time if necessary. Each successive reading should increase in speed.

[Organizational planning]	*[Note taking]*
[Selective attention]	*[Auditory representation]*
[Self-monitoring]	*[Inferencing]*

III./IV. PRACTICE/EVALUATION - Reading

Assign the students to partners or small groups. They compare their notes and pool information to prepare their own individual master procedures lists. (These lists, as mentioned above, should not be part of their experiment reports.) Assign a time limit (e.g., 10 minutes). Allow the students to try spelling the words as best they can, without providing too much assistance; correct spelling will be discussed during the Evaluation stage below.

[Self-evaluation]

[Cooperation]
[Questioning for clarification]

After the students have completed their individual master procedures lists, they dictate the method to the teacher as a class activity. The teacher writes the steps on the chalkboard or overhead transparency, focusing on the correct spelling of all the words. If the students have misspelled some of the words, this is their chance to make corrections as they compare their master procedures lists with the copy on the board or overhead.

Strategy Instruction:

[Deduction/induction]--

Ask:

- Do these steps tell you what to do? (yes)
- When something tells you what to do, what is it called? (a command)
- Another word for a sentence which is a command is **imperative**. These sentences are written in the imperative.
- What does each one begin with? (a verb)
- Yes, a verb in the imperative form. We will talk more about these a little later in the lesson.

The students now work in pairs or small groups assigned by the teacher. They refer to the methods steps on their master procedures lists to perform the experiment, recording their observations on their charts.

Strategy Instruction:

[Organizational planning]-- *[Grouping]--*

Briefly demonstrate the desired format of the 5-column data recording chart, without writing in the specific column headings. E.g.:

Then ask:

- What will the title of the chart be? (Temperature Experiment Chart)
- What will we write for a heading in the first column? (Times)
- What will be the heading of the second column? (Cold)
- What will be the heading of the third column? (Warm)
- Of the fourth column? (Hot)
- Of the fifth column? (Air)
- What kind of letters do these headings start with? (capitals)
- Why? (because they are headings)
- What will you write under "Times"? (the times we checked the thermometers)
- When do you first check the thermometers? (at the beginning) Yes; we will call this the "zero minute" time.
- Then how often will you check the thermometers? (every 3 minutes)
- For how long? (15 minutes)
- What will you fill in under the headings "Cold," "Warm," "Hot," and "Air"? (the temperatures of the thermometers)
- The word we use for this is **recording** — the verb is "to record." You will be recording the different temperatures every 3 minutes. How will you know where to record the temperatures? (under the right headings)
- So you will be recording your temperatures in different groups — cold, warm, hot, and air? (yes)
- You are using a learning strategy here, because you are grouping things in different sets. What should this strategy be called? (grouping)
- Start the experiment.

The students are given the equipment to perform the experiment and to complete the observations chart.

When they are finished, instruct them to draw a diagram of their experiment, labeling the materials (beakers, thermometers, etc.). This diagram will later be inserted or glued into their experiment report.

Next, the students are given graph paper and shown how to draw a line graph. The horizontal axis should be labeled in 3-minute time increments beginning at zero, and the vertical axis in 5 degree temperature increments from 0°C to 100°C. They then use the data recorded on their observation charts to construct a line graph depicting the temperatures in the cold water, in the warm water, in the hot water, and in the air.

[Selective attention]
[Self-monitoring]
[Self-evaluation]

[Resourcing]
[Grouping]
[Note taking]
[Summarizing]
[Imagery]
[Elaboration]
[Transfer]
[Inferencing]

[Cooperation]
[Questioning for clarification]
[Self-talk]

V. FOLLOW-UP - Writing

When the experiment, chart, diagram, and graph have been completed, teach the students how to transform the steps of the method from the imperative to the passive voice. Discuss, demonstrate, and model this writing activity with the class to ensure their success when they are writing the methods sections of their experiment reports. They use their master procedures sheets and consciously carry out the necessary grammatical transformations, as demonstrated below.

Example:

- What part of the experiment tells us what to do? (the method)
- Take out your notes on the method, on your procedures lists. Also take out your experiment reports. Have you written the heading **Method:** after the apparatus section? (yes) Good. Now let's write the method together. To get ready for this, write the numbers 1-7 down the left side of your page, under **Method:**.

[Organizational planning]

- What was the first step on your instruction list?

    1. Fill one beaker with cold water.

- What form is the verb in this sentence? (imperative) Why? (tells us what to do)
- Now we want to write the method in your experiment reports, but we don't want to write it in the imperative. Have you finished this experiment? (yes) So you did it in the past. What tense do we want to use, then? (past tense)
- Let's try it. How would you write step 1 in the past tense?

1. We filled one beaker with cold water.

- [Write this on the board.] Yes, you could do it this way. What is the subject of this sentence? ("we") What is the verb? ("filled") Is this past tense? (yes) How do you know? ("-ed")
- But this is not the best way to write science experiment reports. In reporting science experiments, we don't want to say who performed the different steps, because it doesn't really matter who did them. The important thing is **what happened**, not who did it. We want to be **impersonal**, which means we don't want to write about ourselves. What is the opposite of "impersonal"? (personal) That's right; **personal** means to talk about yourself. What do we want to be when we write an experiment report? (impersonal)
- Here is another way to write the sentence.

Demonstrate how the original sentence can be transformed to the passive voice, using arrows (preferably in a different colour) to show the movement of the sentence object (*one beaker*) to subject position. Demonstrate also (a) how to insert the appopriate past tense form of the verb "to be" (namely "was" here) to form the passive voice, and (b) how to change the imperative form of the verb to the past participle. These transformations are shown below:

1. ← was Filled one beaker with cold water.

Result:

1. One beaker was filled with cold water.

Emphasize the need to capitalize the word "one" and change the "F" in "fill" to lower case in the new sentence.

At this point the students should be able to carry out the passive transformation on steps 2 and 3 by themselves, since these sentences are very similar to step 1.

The degree of instruction necessary from this point will depend on the proficiency of the students. You may wish to go through the remaining steps on the board or transparency, demonstrating how each sentence can be changed to the passive voice. If you choose this option, be sure to point out the irregular past participles "put" and "left" in step 4. Also emphasize the need to use "were" (not "was") in forming the passive in steps 5-7, because the new subject will be plural. The students should watch and not write while these changes are demonstrated; when you have finished, they can write the passive sentences by themselves.

Alternatively, you may simply write the past participle forms above the imperative verbs, and then let the students try to complete the rest of the changes themselves. Should you choose to reduce the amount of teacher-controlled assistance in this way, it would probably still be a good idea to do step 5 as a demonstration, in order to show the need to use "were" instead of "was" with plural subjects.

Regardless of the approach you choose, ensure that the students end up with a complete list of the steps of the experimental method, written in the passive voice. This completes the **Method** section of their experiment reports.

Two more examples may be helpful. First consider the change of method step 4 from the imperative to the passive voice. Notice the irregular past participles.

4. was Put one thermometer in each beaker and was l~~ea~~ve one out in the air.
left

Result:

4. One thermometer was put in each beaker and one was left out in the air.

Now consider the transformation of method step 5. Notice the compulsory use of "were" here, since the subject of the passive sentence is plural.

5. were Checked the thermometers at the beginning and every 3 min. for 15 min.

Result:

5. The thermometers were checked at the beginning and every 3 min. for 15 min.

[Deduction/induction]
[Transfer]

After the students have finished rewriting whichever methods steps they were assigned, they can work in pairs or small groups to compare their sentences and correct their work. If necessary, conduct a whole-class discussion in which students contribute answers that can be written on the board or overhead; these answers can serve as a key for self-correction.

[Self-evaluation] *[Cooperation]*

Three more steps need to be completed in order to finish the experiment report. First, the students should follow their **Methods** section with **Observations**. They write the heading **Observations:**, and then glue their observation charts and line graphs onto their experiment reports.

The next step is to write the **conclusions**, under the heading **Conclusions:**. The degree of sophistication attempted here will depend on the students' cognitive and academic proficiency, and the teacher should adjust the level of expectation appropriately. On the lowest level, students can simply be asked to conclude with descriptive statements like those following question 1 below. On a higher level, they can be asked to draw conclusions of the type suggested by questions 2-5.

Regardless of the level aimed at, the teacher should provide assistance with the content and model suitable sentence forms for reporting the conclusions. The students should then write their own conclusions in their experiment reports.

Following are some questions that may prove useful in encouraging the students to think about their observations and draw conclusions based on this data.

1. How much did the temperature of the water in each beaker change in 15 minutes?

   Describe these changes in the past tense, using the irregular past tense verbs "rose" and "fell." E.g.:

   - The temperature of the cold water rose 8°C in 15 minutes.
   - The temperature of the hot water fell 15°C in 15 minutes.

2. Which temperature changed the most? Why? (Note: The question "why?" is not trivial. The temperature of the hot water should change the most, because it begins at a setting farthest removed from room temperature. Boiling water has a temperature of 100°C, while room temperature is around 20°C. The difference is about 80°C. In contrast, the difference between the cold water temperature and room temperature is only around 20°C.)

3. Which temperature changed the least? Why? (The temperature of the thermometer in air will not change at all, since it begins at room temperature.)

4. Which temperature changed by the greater amount in the other two beakers? Why? (The answer here will depend on the initial temperature of the warm water. If this is greater than 42-44°C, the warm water temperature will change faster than the cold water temperature because it begins farther from room temperature.)

5. Can we conclude with a general rule which describes how fast the temperature of water will change with time?

   This "rule" can be stated rather precisely using scientific language, as follows:

   > **The rate of change of temperature varies as the difference between the temperature of the water and room temperature.** (In other words, the greater the difference between the water temperature and room temperature, the greater the rate of change.)

   However, this kind of statement is probably a little beyond these students. A better choice at this early stage might be something like the following:

   > **The temperature of the water changes fastest when it is the farthest from room temperature.**

   Or, to use a sentence pattern that is quite common in academic subjects (e.g., science, geography), you may prefer that they state the generalization as follows:

   > **The farther the temperature of the water is from room temperature, the faster its temperature changes.**

   (As incidental practice, you could have the students try to complete this statement after substituting "closer" for "farther" in the first clause of this sentence.)

The students will obviously require assistance in stating generalizations like these. Nevertheless, it is important that they arrive at some conclusion along these lines, as the original objective of the experiment was to discover how cold, warm, and hot water affect rates of temperature change. The statements above represent an answer to this question, and the students should be made aware of this.

[Self-monitoring] *[Deduction/induction]* *[Cooperation]*
[Elaboration]
[Imagery]

As a final step in completing their experiment reports, the students glue their diagrams (completed near the end of the Practice/Evaluation stage) into their reports.

Lesson 3: The Water Cycle - Science, Geography (Text Questioning Technique)

Objectives:

Content Objectives:

- To understand the water cycle
- To learn about evaporation, condensation, and precipitation

Language Objectives:

Skills:

- Listening - to note take; in group discussions
- Speaking - to compare and correct answers in group discussions
- Reading - for specific information to verify answers
- Writing - to complete declarative sentences in answer to questions

Linguistic Knowledge:

Vocabulary Development:

cycle, round and round, movement, heats, rise, air, gas, water vapor, surface, body of water, process, evaporation, cool (verb), warmth, liquid, condensation, clouds, form, formation, in the form of, precipitation, rain, snow, complete, sleet, hail, oceans, lakes, rivers, streams, inland, constantly, air currents, cause, float, drop (noun), water droplets, stick, increase, continue, collect, repeat, effect, result, freeze, melt

Structures:

- Subject-verb agreement
- Present tense to express scientific truths
- Declarative sentence form
- Prepositions
- Coordinating Conjunction *and*
- Sentence combining — writing compound and complex sentences
- Adverbial clauses of reason (*because ...*) and time (*when, as ...*)
- Pronouns *it* and *they*
- Demonstrative adjectives and pronouns *this, these*
- Infinitives following the verbs *continue, cause*
- Noun suffix *-tion*

Discourse Features:

- Using pronouns and demonstratives to achieve cohesion
- Discourse markers of cause and effect: *causes, as a result, resulting in*
- Theme-rheme structure

Functions:

- Reporting factual information by writing declarative sentences (derived from questions)
- Expressing cause and effect
- Defining (the "is known as" pattern)

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Predicting - when guessing what the reading passage is about
- Inferencing - when answering questions, note taking, and completing the cycle diagram
- Note taking - during the dictation stage
- Deduction/induction - when writing sentences and completing structure-focused exercises
- Imagery - using the visual of the water cycle
- Resourcing - using a globe
- Auditory representation - while taking notes

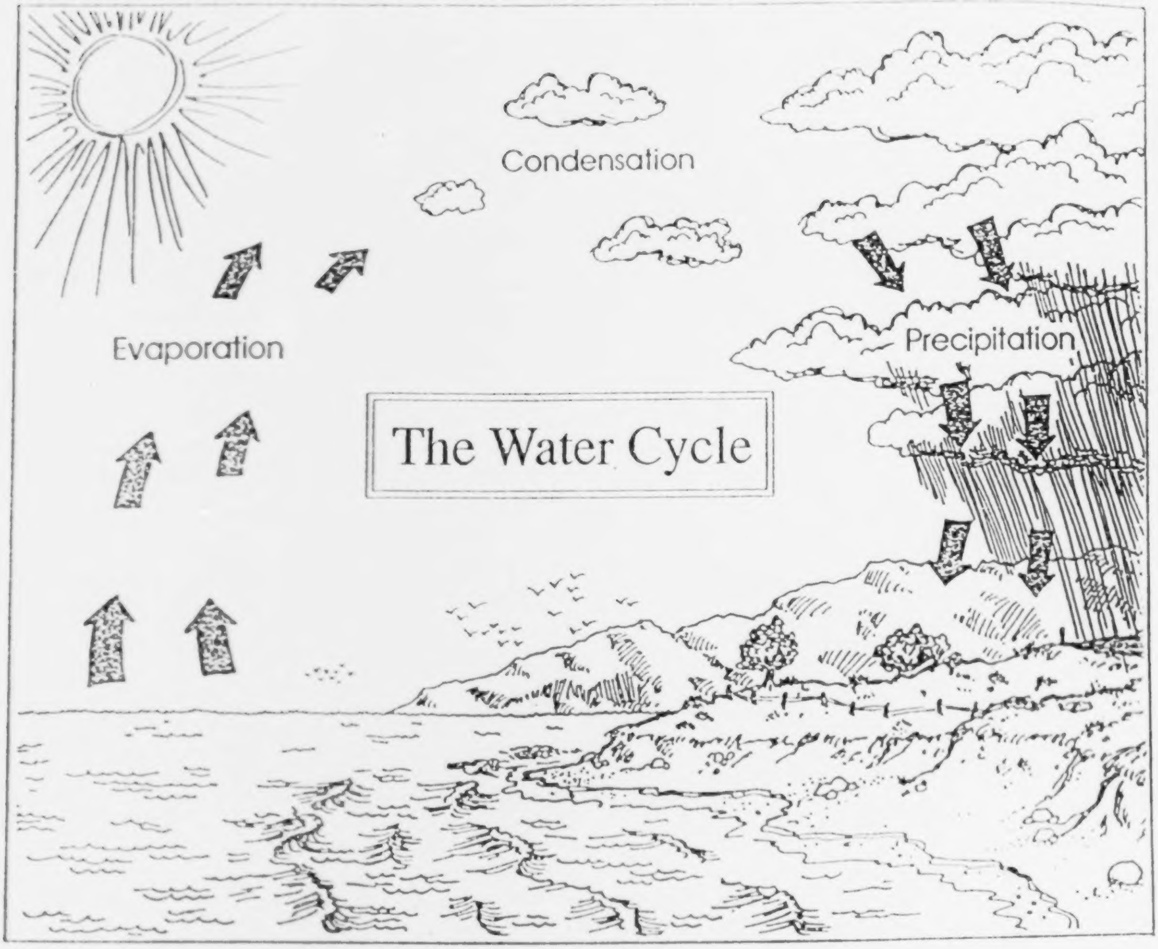
Social-Affective Strategies:

- Cooperation, Questioning for clarification

Materials:

- Water cycle diagram from Santillana *Bridge to Communication, Middle Level C, Student Language Book*, Focus Sheet 9.2a.
- Written text adapted from similar texts in Open Sesame ESL Series, *Ernie and Bert's Red Book* and Santillana *Bridge to Communication, Middle Level C, Teacher's Guide*, 216.

The Water Cycle — VISUAL


Condensation
Evaporation
Precipitation
The Water Cycle

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The Water Cycle

Most of the earth is covered with water in the form of oceans, lakes, rivers, and streams. Water is constantly moving from one place to another. This movement is known as the **water cycle**.

This cycle begins when the warmth of the sun heats the surface of these bodies of water. This warmth causes the water to rise into the air. As a result, the water becomes a gas called water vapor. This process is known as **evaporation**.

Air currents carry this water vapor high up into the sky, where temperatures are lower than at the surface of the earth. As a result, the water vapor cools, causing it to become a liquid again in the form of very small drops called water droplets. This process is known as **condensation**. Sometimes many droplets collect in the same place, resulting in the formation of clouds.

As these water droplets continue to collect in the clouds, they begin to stick together, resulting in larger droplets. After a while, these become too heavy to float in the air. As a result, they fall back down to the oceans, lakes, rivers, and streams that they came from. This process is known as **precipitation**. When the atmosphere is warm, precipitation is usually in the form of rain. When the atmosphere is cooler, the water droplets freeze, resulting in snow, sleet, or hail.

The water cycle never ends. It continues to repeat itself over and over again.

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Procedures:

Note: This lesson utilizes the **Text Questioning Technique (TQT)** described in Chapter 3.

I. PREPARATION - Brainstorming

1. Tell the students they have one minute to look at the title, picture, and labels of the text and supporting visual. They are to use these to guess or predict what the reading passage is about.

2. After one minute, the students write down their predictions. Spelling and sentence structure (syntax) are not important at this time.

[Advance organization] *[Imagery]*
[Prediction/inferencing]

3. Listen to each student's prediction, writing the key words on the board or transparency, e.g., water cycle, evaporation, condensation, precipitation.

Strategy Instruction: Developmental Questions

[Imagery]--

- What is this article going to be about? (the water cycle)
- How do you know? (the title)
- What is the water cycle? (how water goes round and round)
- What does "round and round" mean? (it keeps going around)
- Can you give me an example? (Water goes from the ground, into the air, and back down to the ground.)
- How do you know water does this? (from the picture)
- What part of the picture shows you that the water goes up into the air and back down to the ground? (the arrows)
- Can you think of some other words, not in this picture, that have the word "cycle" in them? (e.g., bicycle, tricycle)
- How do their wheels go? (round and round)
- What does "cycle" mean? (something that goes round and round)
- How do the arrows in the picture help you? (to understand that the water cycle goes round and round)
- Look at your **green sheet**. What strategy are you using when you use the picture to understand new information? (using pictures and images) [**Note:** the use of coloured strategy sheets is discussed in Chapter 1; samples of these sheets can be found at the end of that chapter.]

[Advance organization]--

- How many parts are there to the water cycle? (three)
- How do you know? (three words in the picture)
- What are the three words, or parts of the water cycle? (evaporation, condensation, precipitation)
- Would they be like headings? (yes)
- Look at the reading passage. How many paragraphs are there? (five)
- Do you think the words "evaporation," "condensation," and "precipitation" will be described in the passage? (yes)
- Skim through the passage to find these words. Did you find them? (yes)
- Are they all in the same paragraph? (no)
- Where are they? ("Evaporation" is in paragraph 2, "condensation" is in paragraph 3, and "precipitation" is in paragraph 4)
- Was it easy to find these words? (yes)
- Why? (in heavy or bold print)
- What do you think all of paragraph 2 will be about? (evaporation)
- What do you think all of paragraph 3 will be about? (condensation)
- What do you think all of paragraph 4 will be about? (precipitation)
- Why? (because those are key words listed in the passage and in the picture)
- Do all three of these words describe the title — "The Water Cycle"? (yes)

- Does looking at the picture and the article **in advance** [before you read it] help you to **organize** your thoughts? (yes)
- Does doing this help you to plan what or how you will learn? (yes)
- Could we call this "advance organization"? (yes)
- If it helps you to plan what or how you will learn, which strategy sheet would you add **Advance organization** to? (the blue one)
- Let's add it. Where should we put it? (first)
- Why? (because it is always the first thing we do before we start)
- Can we write a **definition** of "advance organization"? How could we define it? (Write a class definition, e.g., *Advance organization is the strategy of looking at all the parts of a passage to predict what it is about.*)

4. Tell the students to look at the article again. Discuss the title, headings, and picture by asking questions to elicit more vocabulary through brainstorming. Write the key vocabulary on the board or transparency; these words are left on the board to aid the students when they are note taking during the presentation.

Ask:

- [Show a globe.] What is most of the earth covered with — land or water? (water)
- Where is the water? (oceans, lakes, rivers, streams)
- What is an ocean? (a very large body of water)
- Where are the oceans on this globe? [Have various students identify the oceans and name them. Do the same for some lakes and rivers.]
- What is a lake? (a large inland body of water)
- What is a river? (a long stream of water)
- Does the water move? (yes)
- Where? (from one place to another)
- Give me an example. (Rivers move to lakes or oceans)

[Resourcing]

- Let's look at the picture with the reading passage. How else does water move? (up into the sky and back down to the ground)
- What kind of movement is this called? (a cycle)
- What kind of cycle? (the water cycle)
- Where does the water go first? (into the air)
- Why does the water on earth go up into the air? (The sun heats it.)
- When the water goes into the air, is it a liquid, a gas, or a solid? (a gas)
- What do you think this gas is called? (water vapor)
- What is this whole process called? (evaporation)
- How do you know? (The word is in the picture, to show this step.)

- As the water vapor rises higher and higher into the sky, what do you think happens to it? (It cools.) Why? (It gets colder as you go higher.)
- What happens to the water vapor when it cools? (It becomes a liquid again — water.)
- Where? (in clouds)

- What do you think clouds are made of? (water drops)
- Big drops or little drops? (little drops) These are called **water droplets**.
- Looking at the picture, first you see a few small clouds, and then you see more. Why? (more water droplets)
- When the water vapor or gas becomes liquid water again, what is this process or change called? (condensation)

- What happens when there are many big clouds, as you see in the picture? (It rains.)
- Why? (The clouds are too heavy with water drops.)
- When the water falls back to earth, what is this process called? (precipitation)
- Does it rain in the winter? (no)
- What falls instead of rain? (snow)
- Sometimes in the spring or fall, when it's not too cold and not too warm, we get a very wet snow that hurts when it hits your face. What is this wet snow called? (sleet)
- Sometimes, in the summer, water falls from the sky in the form of round balls of ice. What is this called? (hail)
- Do all of these — rain, snow, sleet, and hail — fall from the sky? (yes)
- What are they all forms of? (precipitation)
- Once this cycle is over, the water has returned back to the oceans and other bodies of water it came from. What do you think happens then? (It starts all over again)
- What is this called? (the water cycle)

[Selective attention]
[Advance organization]
[Inferencing]
[Imagery]
[Resourcing]

II. PRESENTATION - Listening

5. Tell the students to **turn over** their articles (i.e., place them face down on their desks). Show them a list of questions about the article, either on the board (previously concealed) or on the overhead. Instruct the students to read the questions (see next page) silently to themselves.

   Then read the questions aloud to the students, reviewing all vocabulary they do not understand. Making use of their suggestions as far as possible, underline in each question (using a different colour chalk or transparency marker) the most important word or words that the students will be listening for during note taking.

[Selective attention]

6. **The students number their papers 1-13 (see page 126), writing A, B, C, ... on separate lines for some of the questions (see page 127). Review the note taking procedure with the students (see page 127).**

QUESTION LIST

Note: The answers, given in italics here, are not included in the list shown to the students.

1. A. What is most of the earth covered with? *water*
   B. In what form? *oceans, lakes, rivers, and streams*

2. A. Where is water constantly moving? *from one place to another*
   B. What is this movement called? *the water cycle*

3. A. What heats the surface of these bodies of water? *the warmth of the sun*
   B. What does this warmth cause the water to do? *rise into the air*
   C. What does the water become? *a gas*
   D. What is this called? *water vapor*

4. What is this process known as? *evaporation*

5. Where do air currents carry this water vapor? *high into the sky*

6. Why does the water vapor cool when it rises? *temperatures are lower*

7. A. When it cools, what does the water vapor become? *a liquid*
   B. In what form? *water droplets*

8. What is this process known as? *condensation*

9. What are formed when many droplets collect in the same place? *clouds*

10. When the water droplets in clouds begin to stick together, what kind of droplets result? *larger droplets*

11. A. Why do these fall back to earth? *they become too heavy to float in the air*
    B. What is this process known as? *precipitation*

12. What are the four forms of precipitation? *rain, snow, sleet, and hail*

13. A. What never ends? *the water cycle*
    B. What continues to repeat itself over and over again? *the water cycle*

Strategy Instruction:

[Organizational planning]-- *[Note taking]--*

Ask:

- When you take notes, what do you write down? (answers only)
- Do you write complete sentences? (no)
- What do you write down? (important words)
- What if you don't know how to spell the word? What do you do? (write part of a word or the first letter)
- What would you write if the answer was "precipitation"? (pre or p)
- Would you know what that stands for later, when you are checking your answers? (yes)
- Who are the notes for? (ourselves)
- Why do you take notes? (to help us remember)
- How many answers will you write in question 1? (one)
- How many answers will you write in question 2? (two)
- How do you know? (A and B parts)
- How many answers will you write in question 3? (four)
- Why? (A, B, C, and D parts)

[Selective attention]--
[Organizational planning]--

- How will you know when you hear an answer? What will you be listening for? (special words)
- What special words will you be listening for? (underlined words in the questions)
- What will be the special words you listen for in question 1? ("covered with")
- What will you hear after "covered with"? (the answer)
- What special words will you be listening for in question 2A? ("constantly moving")

Follow the same procedure with some of the other questions, to ensure that the students understand the importance of listening for the underlined words during note taking.

- Will listening or paying attention to these key words help you to take notes? (yes)
- Which strategy on the blue sheet are you using when you **select** special words to pay **attention** to? (Selective attention)
- What other strategy on the blue sheet are we using when we discuss how we will do the work before we actually do it? (plan what I will do)

7. Dictate the article fairly slowly to the class, placing exaggerated emphasis on the key words the students will be listening for. The students listen carefully for the answers to the questions, writing them beside the appropriate numbers as they hear them. Spelling is not important at this time.

[Self-monitoring]

[Note taking]
[Inferencing]
[Auditory representation]

Strategy Instruction:

[Self-monitoring]--

Ask:

- Did you get all the answers? (no)
- How many did you get?
- Do you want me to read it again? (yes)
- Which answers will you be listening for? (the ones we didn't get)
- What will you do when you hear an answer you already have? (check it)

8. Reread the article more rapidly, allowing the students the opportunity to complete the activity or to check their answers. If necessary, read it a third time.

[Self-monitoring]

[Inferencing]
[Auditory representation]

III. PRACTICE - Speaking and Reading

9. Assign each student to a partner or group. Instruct them to turn their articles over so that they are again face up. Give everyone a few minutes to read the article silently; there should be few comprehension difficulties at this point, as they are by now familiar with the difficult vocabulary and basic concepts.

   Then instruct them to work together in their pairs or small groups, comparing their answers and checking them against the text to ensure appropriateness of content and accuracy of spelling. At this point they should expand all abbreviations so that their answers are written out in full-word form. Assign a set time limit (e.g., 15 minutes) for this task. Circulate while they are working, giving input and assistance when required.

[Self-evaluation]

[Cooperation]
[Questioning for clarification]

Strategy Instruction:

[Cooperation]--
[Questioning for clarification]--

Ask:

- How did you do?
- Did you and your partner (or group) have the same answers?
- Was it easier to check when you worked with a partner (or group)? (yes)

- Why?
- When you cooperated with your partner (or group) and asked questions, did it help you learn?
- What strategies on the pink sheet did you use? (cooperate with classmates to learn, ask questions for clarification)

IV. EVALUATION

10. Tell the students to turn over their articles (face down). Read the questions on the board or transparency one by one, asking students to supply the correct responses. Write down the answers as they are contributed, using the same colour chalk or transparency marker as was used to underline the key words in the questions in step 5. [**Note:** It might be a good idea to collect the articles at this point, as the students may be tempted to look at them when writing their complete sentence answers in the Follow-up stage below.]

V. FOLLOW-UP I - Writing

11. The articles remain **face down** (or, as noted above, they can be collected by the teacher so that the students no longer have access to them). Instruct the students to complete the question-answering exercise individually, this time writing the answers in complete sentences. Following the basic procedure explained in the **Follow-up I** stage of Lesson 1, teach the students how to write a complete sentence using most of the words in the question and the answer beside the question. Do a few examples, and then give the students time to complete the answers by themselves.

Note that some of the questions in this lesson allow the possibility of sentence combining. For example, the A and B parts of question 2 can be combined to give a compound sentence:

2. Water is constantly moving from place to place, and this movement is called the water cycle.

All four parts of question 3 could be combined as follows.

3. The warmth of the sun heats these bodies of water, causing the water to rise into the air as a gas called water vapor.

Needless to say, students will find it difficult to carry out the sentence combining task without assistance. Advice can be given in different ways and at different stages, depending on the proficiency of the class. Some possibilities are as follows.

a) List the key linking markers (conjunctions, etc.) that the students can use to link the multiple answers in the appropriate questions. E.g.:

   2. *and*
   3. *causing, as, called*
   7. *in the form of*

b) After the single-sentence answers have been completed, work with the class as a large group to combine sentences appropriately.

c) After the single-sentence answers have been completed, demonstrate the sentence combining process with a few selected examples, and then allow the students to work in groups to complete the remaining questions themselves.

EXTENDED ACTIVITIES

Teaching Other Structures:

A number of important structures can be taught or practised through examination of the reading passage and/or the answers the students have written. In some cases the rules governing these structures can be called to the students' conscious attention, while in other cases it may be preferable to avoid explicit instruction and simply regard certain structures as good comprehensible input that may ultimately promote acquisition. Following are some examples of potentially teachable structures.

a) **Subject-verb agreement.** As demonstrated in Lesson 1 of this unit, subject-verb agreement can be studied explicitly through examination of the students' written answers to the questions.

b) **Present tense to express scientific truths.** The article makes exclusive use of the present tense because it explains a scientific process which occurs at all times. The formation of this tense (especially the use of the third person singular "-s" suffix) and its use in expressing scientific truths can be pointed out to the students.

c) **Prepositions.** Students can be given a copy of the original reading passage with all the prepositions removed. Their task is to fill in all the prepositions as a cloze exercise. Prepositions are notoriously difficult to teach explicitly because the rules governing them are so idiosyncratic and complex, so this kind of "experiential" activity is particularly good for giving students practice in using the prepositions in academic discourse. The exercise is as follows.

* * *

The Water Cycle

Most ____ the earth is covered ____ water ____ the form ____ oceans, lakes, rivers, and streams. Water is constantly moving ____ one place to another. This movement is known ____ the **water cycle**.

This cycle begins when the warmth ____ the sun heats the surface ____ these bodies ____ water. This warmth causes the water to rise ____ the air. ____ a result, the water becomes a gas called water vapor. This process is known ____ **evaporation**.

Air currents carry this water vapor high up ____ the sky, where temperatures are lower than ____ the surface ____ the earth. ____ a result, the water vapor cools, causing it to become a liquid again ____ the form ____ very small drops called water droplets. This process is known ____ **condensation**. Sometimes many droplets collect ____ the same place, resulting ____ the formation ____ clouds.

As these water droplets continue to collect ____ the clouds, they begin to stick together, resulting ____ larger droplets. ______ a while, these become too heavy to float ____ the air. ____ a result, they fall back down ____ the oceans, lakes, rivers, and streams that they came ____. This process is known ____ **precipitation**. When the atmosphere is warm, precipitation is usually ____ the form ____ rain. When the atmosphere is cooler, the water droplets freeze, resulting ____ snow, sleet, or hail.

The water cycle never ends. It continues to repeat itself over and over again.

****

Notice that a number of the deleted prepositions are part of special expressions that are common in academic writing, so students will benefit from the opportunity to focus on the use of these prepositions in these contexts. Some examples of such expressions are:

- **as** a result
- is known **as**
- **in** the form **of**
- resulting **in**

d) **Infinitive forms following the verbs *continue* and *cause*.** The verb *continue* is used twice in the passage (*continue to collect, continue to repeat*). The occurrence of the infinitive after the verb can be noted, and students could be given additional practice in producing this structure. E.g.:

- The water continues to evaporate.
- Air currents continue to carry the water vapor high up into the sky.

The verb *cause* is also used twice in the passage (*causes the water to rise, causing it to become a liquid*). The structures to be taught here, in which *cause* is followed by another verb, is:

X causes Y to Z
causing Y to Z

This is a very important verb in academic writing, as it is frequently used to express cause-effect relationships (see the section on academic language functions below). The students should definitely learn how to use it accurately, and this is a good opportunity to teach it. It would be a relatively simple matter to prepare a worksheet, based on the content material, which would give students a chance to manipulate this structure. Various formats are possible here; one possibility would be to give "triplets," i.e., sets of expressions which the students must join together in a sentence using either *cause(s)* or *causing*.

E.g.: become a gas / the sun's warmth / the water

Answer: The sun's warmth *causes* the water to become a gas.

E.g.: clouds / many droplets collect in one place / form

Answer: Many droplets collect in one place, *causing* clouds to form.

Further practice in the proper use of this verb occurs in the cause-effect exercise discussed below.

e) **The noun suffix "-tion."** This suffix was examined in Lesson 1 of this unit, but the present lesson offers opportunities to extend the students' knowledge about it. Explain that "-tion" can be added to many verbs to produce nouns. The formation rule includes two main variants, as follows. Be sure to emphasize the changes in pronunciation (especially stress) that accompany the change from verb to noun.

i. The verb ends in "te." In this case, simply remove the "e" and add "ion."

E.g.: precipitat**e** - precipitat**ion**
evaporat**e** - evaporat**ion**

ii. The verb ends in anything else. In this case, the general rule is to remove a final "e" (if it exists) and add (usually) the suffix "ation."

E.g.: condens**e** - condens**ation**
continu**e** - continu**ation**
observ**e** - observ**ation**
form - form**ation**

f) **The noun & verb *form*, the noun *formation*, and the expression *in the form of*.** These terms can be explained to the students using examples from the reading passage, which contains a number of instances of them. Emphasize that the noun *formation* means the process in which something is formed (e.g., a cloud), whereas the noun *form* means the shape that something already has.

E.g.: Sometimes many droplets collect in the same place, resulting in **the formation of** clouds. (This means that the clouds are formed this way.)

Then the water droplets are **in the form of** clouds. (after formation)

Teaching Discourse Features:

In a fashion similar to that explained in Lesson 1, **theme-rheme structure** is practised in this lesson by virtue of students' placing the answers to questions (new information) at the end. E.g.:

1. Most of the earth is covered with water (rheme — new information).

A second discourse feature that might be focused upon in this lesson is the use of pronouns like *it* and *they*, as well as demonstrative adjectives like *this* and *these*, to achieve textual cohesion. One exercise that students can perform to raise their awareness of this discourse feature is to replace these words in the original text by the full noun phrases that they represent. This can be a difficult task, especially if the resulting phrase contains the necessary information following the noun rather than preceding it, as in items 1, 3, and 5 below; consequently, it is a good idea to provide preliminary instruction on how to complete such items. Some help with these items has been included in the exercise below.

* * *

Exercise: Replacing *it, they, this,* and *these*

The following sentences are taken from your reading passage. Find the sentences, and rewrite each one so that the underlined word it contains (*it, they, this,* or *these*) is removed and replaced by something else.

1. This movement is known as the water cycle.

   The movement of __________ from ______________________ ________________

   ____

2. This cycle begins when the warmth of the sun heats the surface of bodies of water.

   ________________ cycle ____

3. This process is called evaporation.

   The process in which ________ changes from __________ to ________________

   ____

4. As a result, the water vapor cools, causing it to become a liquid again.

   ____

5. This process is known as condensation.

   The process in which ______________________ from ______________________

   ____

6. As these water droplets continue to collect in the clouds, they begin to stick together, resulting in larger droplets.

   ____

   ____

7. After a while, these become too heavy to float in the air.

   ____

8. As a result, they fall back down to the oceans, lakes, rivers, and streams that they came from.

   ____

   ____

9. It continues to repeat itself over and over again.

   ____

* * *

Answers to above exercise:

1. The movement of **water** from **one place to another** is known as the water cycle.
2. **The water** cycle begins when the warmth of the sun heats the surface of bodies of water.
3. The process in which **water** changes from **a liquid** to **a gas** is called evaporation.
4. As a result, the water vapor cools, causing **the water vapor** to become a liquid again.
5. The process in which **water vapor changes** from **a gas to a liquid** is known as condensation.
6. As these water droplets continue to collect in the clouds, **the water droplets** begin to stick together, resulting in larger droplets.
7. After a while, **the larger droplets** become too heavy to float in the air.
8. As a result, **the larger droplets** fall back down to the oceans, lakes, rivers, and streams that **the larger droplets** came from.
9. **The water cycle** continues to repeat itself over and over again.

Teaching Academic Language Functions.

(a) **Defining.** One academic language function (ALF) that can be taught in this lesson is **defining**, using the "is known as" pattern. In Lesson 1 of this unit, the students learned the "regular" way of defining and the "is called" pattern. This lesson extends their knowledge to a new pattern. To teach this pattern, begin by presenting the students with a few definitions based on the reading passage. E.g.:

> The movement of water from one place to another is known as the water cycle.
>
> The process of water changing into a gas is known as evaporation.

Conduct a discussion with the students.

- The first sentence tells what the term "water cycle" means. What do we call a sentence that tells the meaning of a term? (a definition)
- Is the second sentence a definition too? (yes)
- What term is defined in the second sentence? ("evaporation")
- Do you remember that definitions can be written in different ways? For example, do you remember the definition of "weather"? (Weather is the condition of the atmosphere.) [Write this on the board.]
- Remember that we can write this definition in a different way, beginning with "the condition of the atmosphere." What is this second way? (The condition of the atmosphere is called weather.") [Write this on the board.]
- Yes, we learned two patterns for **defining** a few days ago. Today we are learning a new pattern for this.

- Look at the two sentences that define "water cycle" and "evaporation." Where are the terms that are defined? (at the end of the sentences)
- Is this like the regular way of defining or the "is called" way? (is called)
- But "is called" is not used in these sentences. What words are used instead? ("is known as")
- Yes, we sometimes use "is known as" instead of "is called" when writing definitions. Look at this definition:

> The layer of air around the earth is called the atmosphere.

- Can we change this to our new pattern? What would it become? (The layer of air around the earth is known as the atmosphere.) [Write this on the board.]

- What about this definition?

  Flurries that last a short time are called scattered flurries.

- Change this to the new pattern. (Flurries that last a long time are known as scattered flurries.) [Write this on the board.]
- Yes, we sometimes use "are known as" instead of "is known as." Why do we use "are" here? ("flurries" is plural)

Provide a few other examples if necessary. Then distribute a worksheet like the following.

* * *

Exercise: DEFINING

Each of the 6 groups of words in column 1 can be matched with a group of words in column 3 to form a proper definition. Write all 6 definitions in your notebook, using each of the terms in column 2 **twice**. Be sure to use proper **punctuation** and **capitalization** in your definitions.

Column 1	Column 2	Column 3
water in the form of a gas	is/are	precipitation
water droplets	is/are called	condensation
evaporation	is/are known as	rain
the process of water vapor changing back to a liquid		very small drops of water
the process of water falling from the sky		water vapor
precipitation in the form of a liquid		the process of water changing to a gas

* * *

Answers to above exercise:

1. Water in the form of a gas is called (is known as) water vapor.
2. Water droplets are very small drops of water.
3. Evaporation is the process of water changing to a gas.
4. The process of water vapor changing back to a liquid is called (is known as) condensation.
5. The process of water falling from the sky is called (is known as) precipitation.
6. Precipitation in the form of a liquid is called (is known as) rain.

(b) Expressing Cause and Effect. The ALF **expressing cause and effect** can also be taught via this lesson, implicitly or explicitly. If explicit instruction is desirable, begin by conducting a discussion like the following.

- What does "cause" mean? (to make something happen)
- If we put a glass of water outside in the winter, what will happen? (the water will freeze) Why? (because it is cold)
- Could we say it this way? [Write:]

  The cold causes the water to freeze.

- We say the cold is the **cause**, and the freezing of the water is the **effect**. The cause makes the effect happen.
- What would happen if we brought some snow inside and left it on the desk? (It would change to water.) Do you know the word for that? (melt)
- Why does the snow melt? (because it is warm)
- I'll begin a sentence, and you end it. [Write:]

  The warmth causes __________________________. (the snow to melt)

- Good, the warmth is the cause, and the melting of the snow is the effect. Do you know another word that means the same as "effect"? We saw it many times in the reading passage. (result)
- Yes, a result is caused by something. What is the result if we take a glass of water outside? (The water freezes.) What is the result if we bring snow inside? (It melts.)
- We use this word "result" in several ways. For example, we often use the term **"as a result"** when we want to say that something has caused something else to happen. Look at these two sentences:

  Air currents carry the water vapor high up into the sky, where temperatures are low. As a result, the water vapor cools.

- What is the cause of this? (air currents — they carry the water vapor high into the sky, where it is colder)
- What is the result? (the water vapor cools)
- What joins the cause and result? What words? ("as a result")
- What punctuation mark comes after the cause? (a period) Yes, the cause is a complete sentence and the result is also a complete sentence. Be sure to follow this rule when you use "as a result."

- Look at this sentence:

  Sometimes many droplets collect in the same place, resulting in the formation of clouds.

- Do you see the word "result" here? (yes — part of "resulting in")
- What is the result here? (the formation of clouds)
- What is the cause? (Many droplets collect in the same place.)
- What joins the cause and result? ("resulting in")

- What punctuation mark comes after the cause? (a comma) Yes, you put a comma after the cause and before the words "resulting in." Notice that the result is one sentence, not two.

- Do you remember what hail is? (yes, frozen rain — like little ice balls)
- When does hail fall? In the winter? (no, in the summer) When in the summer? (when the air is cool)
- Yes. Look at this sentence:

Sometimes the air is cool in the summer.

- Suppose we use this as the cause. What is the result? (hail) If we want to use the word "form" as part of the result, what could we say? (hail forms)
- Yes. But there is a problem here. In English, the result part of your "cause-result statement" can be written in different ways, depending on which words you use to join the cause and result. Let's look at three different possibilities. [Write each on the board.]

1. Sometimes the air is cool in the summer, **causing** ________________

- If we want to use the words "hail" and "form" here, what will we have to write? How about "causing hail form"? (no) What then? ("causing hail to form")
- Good! Yes, you must use the infinitive after "causing," just as you do with the verb "causes."

2. Sometimes the air is cool in the summer. **As a result,** ______________

- What should we write in the blank here? ("hail forms") Good. This is the easiest one — you just write the result as a simple sentence.
- Notice that you must write two sentences in this case. The second one begins with "as a result," with capital "A." Why? (a new sentence) Which punctuation mark follows "as a result"? (a comma) Yes, always.

3. Sometimes the air is cool in the summer, **resulting in** ______________

- This is the hardest one. What do we write in this case, to complete the sentence? Here's a hint — use the word "formation." ("resulting in the formation of hail") Good.
- There is another way to write this one. You can also use the "-ing" form of the verb, with the subject in front of it. We could write:

Sometimes the air is cool in the summer, **resulting in** hail forming.

- Now try this exercise. I'll do the first one with you.

* * *

Exercise: EXPRESSING CAUSE AND RESULT

In your notebook, write **three** different but correct cause-and-result statements for each item below. Connect the two given parts of each statement, beginning with the first part (the one following the number) and ending in the second part (the one following the letter a, b, or c). Use each of the following **once** for each number, to join the two parts.

causing
as a result
resulting in

Be careful — you must use the correct words to join the cause and result! Be sure to use correct **punctuation** and **capitalization** in each sentence you write.

1. the sun heats the surface of the water

   a. ______________ some of the water rises into the air
   b. ______________ some of the water to rise into the air
   c. ______________ some of the water rising into the air

2. the water vapor cools

   a. ______________ it to change back to a liquid
   b. ______________ it changing back to a liquid
   c. ______________ it changes back to a liquid

3. sometimes many droplets collect in the same place

   a. ______________ clouds form
   b. ______________ the formation of clouds
   c. ______________ clouds to form

4. the water droplets begin to stick together

   a. ______________ the formation of larger droplets
   b. ______________ larger droplets to form
   c. ______________ larger droplets form

5. the larger water droplets become heavy

   a. ______________ them to fall from the sky as precipitation
   b. ______________ they fall from the sky as precipitation
   c. ______________ them falling from the sky as precipitation

6. in winter the atmosphere is cold

   a. ______________ the water droplets freeze
   b. ______________ the freezing of the water droplets
   c. ______________ the water droplets to freeze

* * *

Answers to above exercise:

1. a. The sun heats the surface of the water. As a result, some of the water rises into the air.
   b. The sun heats the surface of the water, causing some of the water to rise into the air.
   c. The sun heats the surface of the water, resulting in some of the water rising into the air.

2. a. The water vapor cools, causing it to change back to a liquid.
   b. The water vapor cools, resulting in it changing back to a liquid.
   c. The water vapor cools. As a result, it changes back to a liquid.

3. a. Sometimes many droplets collect in the same place. As a result, clouds form.
   b. Sometimes many droplets collect in the same place, resulting in the formation of clouds.
   c. Sometimes many droplets collect in the same place, causing clouds to form.

4. a. The water droplets begin to stick together, resulting in the formation of larger droplets.
   b. The water droplets begin to stick together, causing larger droplets to form.
   c. The water droplets begin to stick together. As a result, larger droplets form.

5. a. The larger water droplets become heavy, causing them to fall from the sky as precipitation.
   b. The larger water droplets become heavy. As a result, they fall from the sky as precipitation.
   c. The larger water droplets become heavy, resulting in them falling from the sky as precipitation.

6. a. In winter the atmosphere is cold. As a result, the water droplets freeze.
   b. In winter the atmosphere is cold, resulting in the freezing of the water droplets.
   c. In winter the atmosphere is cold, causing the water droplets to freeze.

An alternative exercise, not included here, would require the students to fill in the correct **verb** forms to match the given cause-effect markers. E.g.:

5. *(Use the verb "fall.")* the larger water droplets become heavy

   a. causing them ______________ from the sky as precipitation *(to fall)*
   b. as a result they ______________ from the sky as precipitation *(fall)*
   c. resulting in them ______________ from the sky as precipitation *(falling)*

Such an exercise would be easy to construct from the items above.

Whichever exercise format is used, note that it is very important for the students to write the complete sentences in their notebooks rather than simply fill in the blanks. Writing complete sentences will give them a "feel" for the grammatical forms involved, and thereby enhance language acquisition. Also, the students will get an opportunity to practise the appropriate capitalization and punctuation associated with these structures.

The explanations and exercises suggested here are only a beginning to the teaching of this important function. Future lessons should elaborate upon the ALF **expressing cause and effect**, consolidating students' knowledge of the forms above and introducing new forms where appropriate.

Lesson 4: The Water Cycle Completed - Language Arts (Drawing a Graphic Representation, Reporting)

Objectives:

Content Objectives:

- To elaborate upon the students' prior knowledge about the water cycle through the drawing of a graphic representation and the writing of a descriptive report

Language Objectives:

Skills:

- Listening - for instructions and information
- Speaking - to give information
- Reading - for information
- Writing - headings, subheadings, and details on a graphic representation; a descriptive report

Linguistic Knowledge:

Vocabulary Development:

cycle diagram, stage, main ideas, details, heading, subheading, indent, paragraph, evaporation, condensation, precipitation, cycle, heat (verb), rise (v), gas, water vapor, process, cool (v), liquid, cloud, form, rain, snow, elaboration, transfer, pronoun, demonstrative pronoun

Structures:

- Present tense for scientific truths
- Coordinating conjunctions *and, but* used in sentence combining
- Subject-verb agreement
- Pronouns *it, they*
- Demonstrative pronoun *this*

Discourse Features:

- Paragraph unity
- Discourse markers *first, second, third*
- Theme-rheme structure (e.g., *This process is known as ...; four forms of precipitation are ...)*

Functions:

- Reporting (of factual information in paragraphs derived from a graphic representation)
- Describing
- Defining

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Elaboration - using water cycle information to complete cycle diagram and report; going from questions to diagram to report
- Transfer - of prior knowledge about the water cycle to new tasks
- Inferencing - when completing the cycle diagram
- Predicting - what they are going to do
- Grouping - information in the cycle diagram
- Summarizing - of information in the form of a cycle diagram
- Deduction/induction - when writing a descriptive report
- Imagery - using the cycle diagram as a source of information

Social-Affective Strategies:

- Cooperation, Questioning for clarification

Materials:

- The picture of the water cycle used in Lesson 3.
- Questions and answers from Lesson 3.
- Blank cycle diagram (see Presentation phase).

Procedures:

I. PREPARATION

Review the questions and answers about the water cycle from the previous lesson. Give the students the picture of the water cycle used in that lesson. Ask:

- What are we going to do today? (write our own descriptive report about the water cycle)

[Prediction]

II. PRESENTATION

Strategy Instruction:

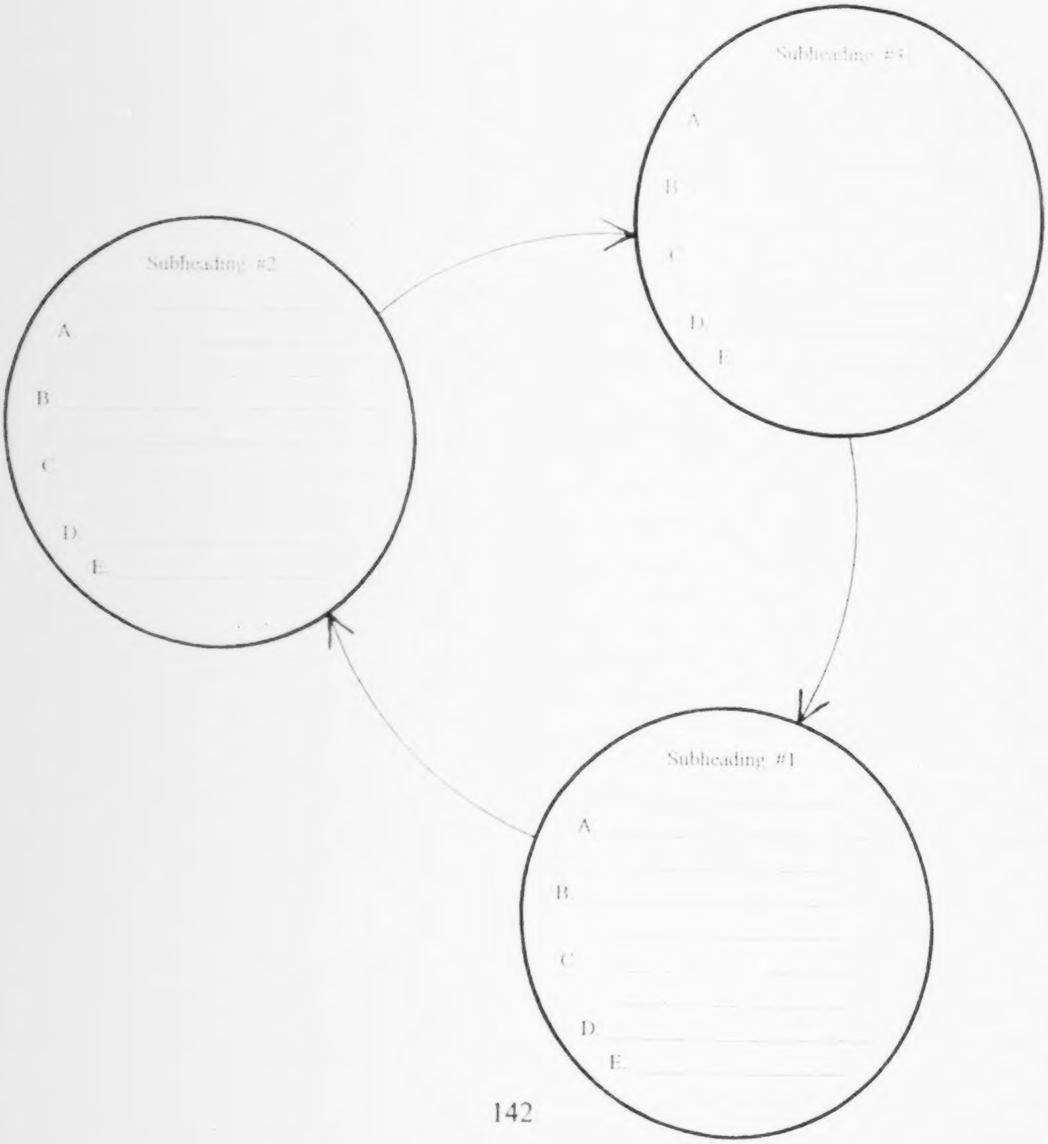
[Advance organization]--

Ask:

- How will you write your report? (don't know)
- What could you use to help you plan your story? (a diagram)
- What kind of a diagram should you draw? (don't know)

- Should your diagram show that the water cycle has a number of different parts or **stages**? (yes)
- Do these stages all happen at the same time? For example, do evaporation and condensation happen at the same time? (no)
- So the different stages happen at different times. One happens first, another happens second, and so on? (yes)
- And the process happens over and over again? (yes) What word means to happen again and again? (cycle)
- Yes, we want our diagram to show that this is really a cycle. Here's how we can do this.

Model the activity using a cycle graphic representation, or simply **cycle diagram**. In this lesson, draw on the chalkboard or show on the overhead a basic cycle diagram containing three stages. The main idea or title is in the centre, the subheadings are in surrounding circles, and the supporting details are listed under the subheadings, as shown below. The circles are connected by curved arrows, to represent the fact that they occur sequentially.



[Organizational planning]--

Ask the following questions, either revising the general diagram by adding specific details as they are elicited, or drawing a new diagram containing these.

- What will be the first thing we write in the diagram? (the title)
- What is this report about? (the water cycle)
- Where should we write this? (in the centre of the diagram)
- Which part of the water cycle should we show first? (evaporation)
- Where will we write "evaporation"? (in the first circle, where it says "Subheading #1")
- Should we begin the word with a capital letter? (yes) Why? (It's a heading.)
- What should we write in the second circle? ("Condensation")
- What should we write in the third circle? ("Precipitation")

Rub out the terms "Subheading #1," "Subheading #2," and "Subheading #3" in the diagram, and replace them with "Evaporation," "Condensation," and "Precipitation" respectively.

- Tell me, what happens after evaporation in the water cycle? (condensation) What shows this in the diagram? (the arrow)
- What happens after condensation? (precipitation) What shows this? (the arrow)
- What happens after precipitation? (evaporation) What shows this? (the arrow) So does the process keep happening over and over again? (yes) Do you think this diagram shows this well? (yes)

- What will we write on the lines under "Evaporation"? (details about evaporation)
- Where can you find these? Do you remember the questions you answered in the last lesson? (yes)

Look at these questions and answers again, showing the transparency from Lesson 3 on the overhead.

- Which questions are about evaporation? (questions 3 and 4)
- How many answers are in question 3? (four)
- Where could we write the information contained in these answers? (on the lines under "Evaporation") On all the lines? (no, just A to D)
- How many answers are in question 4? (one)
- Where would we write this information or detail? (on line E)

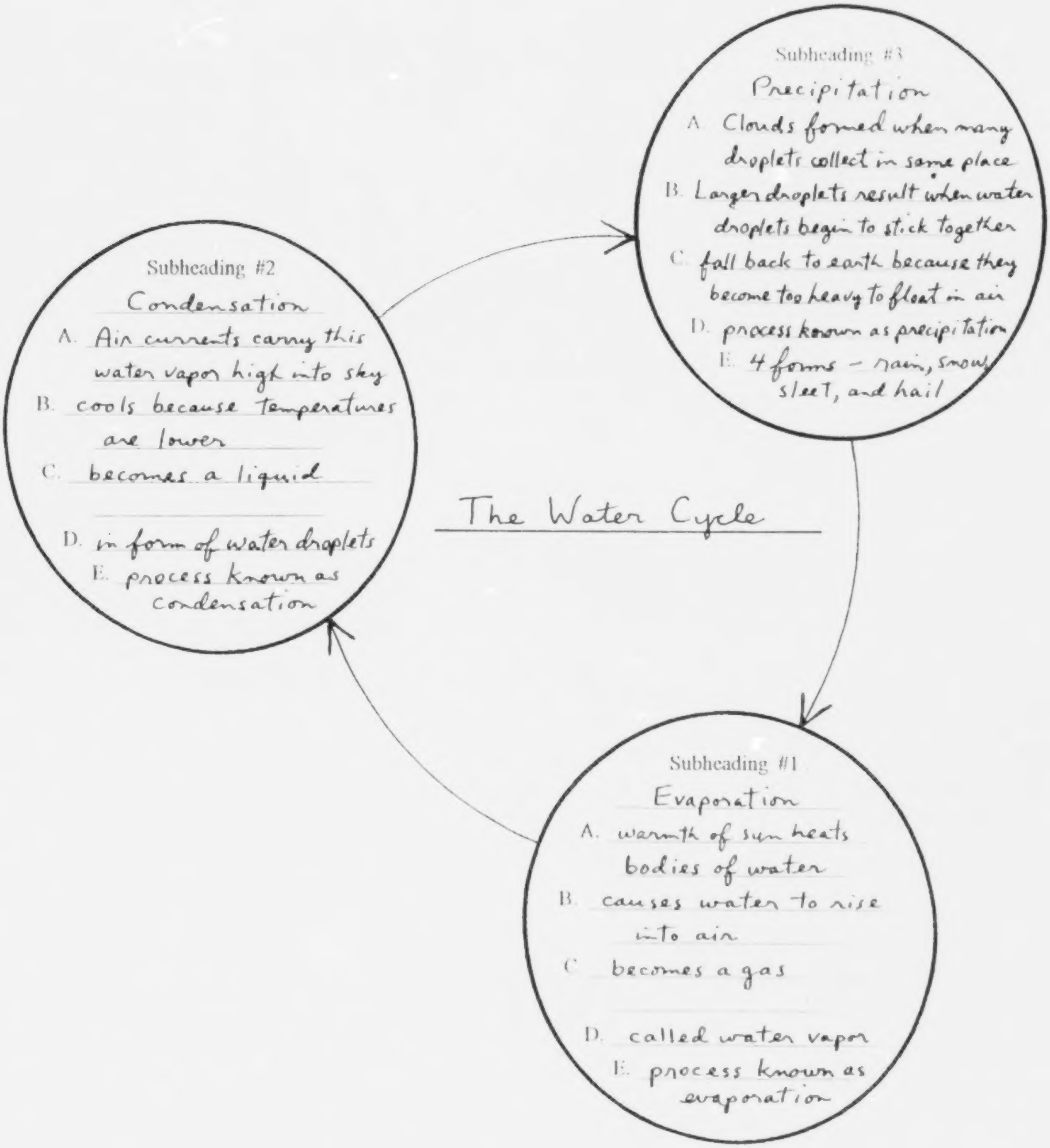
- In the last lesson, you wrote out your answers in complete sentences. Do you remember? (yes) But we don't want complete sentences in the circles, because there isn't enough room. We just want the important information. This is like note taking — we don't want to write all the words, just the important ones.

Continue with this line of questioning, filling in the details in the first circle as they are elicited from the students. Allow them to suggest appropriate wording for these details, revising their suggestions when necessary. The final product should resemble the

"Evaporation" circle below; note that the other two circles have not yet been filled in at this point.

[Selective attention]

[Imagery]
[Grouping]
[Summarizing]
[Inferencing]



The Water Cycle

Subheading #3
Precipitation
A. Clouds formed when many droplets collect in same place
B. Larger droplets result when water droplets begin to stick together
C. fall back to earth because they become too heavy to float in air
D. process known as precipitation
E. 4 forms – rain, snow, sleet, and hail

Subheading #2
Condensation
A. Air currents carry this water vapor high into sky
B. cools because temperatures are lower
C. becomes a liquid
D. in form of water droplets
E. process known as condensation

Subheading #1
Evaporation
A. warmth of sun heats bodies of water
B. causes water to rise into air
C. becomes a gas
D. called water vapor
E. process known as evaporation

- Will this diagram make it easier to write your descriptive report? (yes)

Strategy Instruction:

[Organizational planning]--

- By drawing this diagram, we have planned what we are going to write about. Which strategy are we using from the blue sheet? (planning)

[Transfer]-- (not on the green sheet)
[Elaboration]--

Tell the students to turn to the green sheet and ask:

- What do you need to know to complete your cycle diagram? (all about the water cycle)
- Do you have all the information needed to fill in the rest of the cycle diagram? (yes)
- How did you get this information? (by answering the questions)
- Does having this prior knowledge help you make your cycle diagram? Does it make things easier for you? (yes)
- When you construct your cycle diagram, you are increasing your prior knowledge of the water cycle, because you are representing it in a different way. What strategy are you using when you increase your knowledge (i.e., make it larger) by doing something new with it? (**elaboration** — on the green sheet)
- What strategy are you using when you use prior knowledge to complete a new task? What you are doing here is *transferring* your knowledge to a new task. (**transfer** — not on the green sheet; it could be added here).

[Inferencing]--
[Grouping]--
[Summarizing]--
[Imagery]--

- When you are making intelligent guesses to fill in the missing parts of the diagram, what strategy are you using? (**inferencing**)
- How do you know what to write in the circles? (from the questions and answers)
- How do you know where to write the information? (under the right subheadings)
- So the subheadings help you to decide where to write the details? (yes)
- How? (They help us decide where the information belongs.)
- What strategy are you using when you put the details under the appropriate subheadings? (**grouping**)
- Once the diagram has been completed, what will you have? (a summary of the report)
- What strategy is this? (**summarizing**)
- Does putting the water cycle into the form of a diagram make it easier to understand? (yes)
- A diagram is like a picture, isn't it? What strategy are we using when we represent something in a form like that? (**imagery**)

- These strategies are all being used when you make a cycle diagram like this. Will this cycle diagram help you to write your report about the water cycle? (yes)

III. PRACTICE

Each student (or, alternatively, pair of students) now completes circles #2 and #3, filling in the details from their previous answers. Note form is used in each case. When the cycle diagrams are completed, the students show them to the teacher and they discuss them.

[Organizational planning]
[Self-monitoring]
[Self-evaluation]

[Transfer]
[Elaboration]
[Inferencing]
[Grouping]
[Summarizing]
[Imagery]

[Cooperation]
[Questioning for clarification]

IV. EVALUATION

When all the cycle diagrams have been completed, ask the student to contribute the details for circles #2 and #3. Fill in these details on the cycle diagram on the chalkboard or transparency. The students can compare the details on their diagrams with those on the board, since these are all in note form, variations are possible, and the students should be encouraged to retain their own versions (if suitable) rather than conform to the "consensus" version on the chalkboard.

[Self-evaluation]

Now demonstrate or model how to write a descriptive report on the water cycle, using their cycle diagram as a guide to organizing information.

Strategy Instruction:

[Organizational planning]-- *[Deduction/induction]--*

- What is the title? (The Water Cycle)
- Where is the title in the diagram? (in the centre)
- How do you start each word of the title? (capital letters)
- Where do you write the title of your report? (at the top of the page) Where at the top of the page? (in the centre)
- After the title, you should leave a line empty. Begin your report on the third line of your page. What do you write next? (Subheading #1 - Evaporation)
- Will this be your first paragraph? (yes)
- How many paragraphs will there be in your report? (three) How do you know? (three subheading circles)
- You are right, in a way. There will be three main paragraphs, each describing one step of the water cycle. But it isn't good to start a report without explaining what you are going to describe. The title tells the reader what is going to be described,

of course, but it is also a good idea to write a short paragraph introducing the topic. There are many ways to do this, but in this report let's use a very simple one. Suppose we start by saying that "this report," the one you are writing, "describes" something. What does it describe? (the water cycle) Good. So let's use this as our opening sentence. It will be a complete paragraph — we don't need anything else to introduce our topic.

This report describes the water cycle.

- What do you have to remember to do with each paragraph? (indent) How do you indent? (leave a space of 2 or 3 centimetres)

- Let's look at the next paragraph, which is really the first paragraph of the description. How many details do you have? (five)
- How many sentences could you write? (five)
- Do you think we could combine some of the sentences? (yes)
- How? Could you write A, B, C, and D in one sentence? (yes)
- Let's look at our circle and write it together. Example:

> The warmth of the sun heats bodies of water, which causes the water to rise into the air where it becomes a gas called water vapor.

- Which words came from the first circle in our cycle diagram? Let's underline them.

Have the students contribute the words to be underlined, and underline these as they are given. The result is the following:

> The warmth of the sun heats bodies of water, which causes the water to rise into the air where it becomes a gas called water vapor.

- Which word did we use to join A to B? ("which")
- Which word did we use to join B to C? ("where")
- What other words did we have to add, to make this into a good English sentence? ("the")
- Where did we put "the"? (in front of nouns) For example? ("warmth," "sun," etc.)
- Do we need to add "the" to make this a correct sentence? (yes) Remember, in English we must use words like "the" and "a" in front of nouns, most of the time.

- Besides the joining words and "the," did we add any other words? (it)
- What does "it" stand for? (the water) Do you know what kind of word "it" is? (a pronoun) Yes, a **pronoun** is a word that stands for a noun. "It" stands for "the water" here.
- What if you wanted to use a pronoun to stand for "bodies of water"? Would you use "it"? (no) Why not? (more than one, or plural) Which pronoun do you have to use when the noun is plural? ("they")
- Good. Let's review this: pronouns are words that take the place of nouns. You may use pronouns once you have written the nouns.

- Now let's write the last sentence of the first paragraph together. Which words do we use from the cycle diagram? ("process known as evaporation")
- What do we have to write before "known as"? ("is") Why? (You have to say "is known as" in a definition.)
- How will you start your sentence? What will be the first word? Which process are we talking about, or describing? (evaporation) Yes, but we just described evaporation in the first sentence. Now we are saying what this is called. So what word should we use in front of "process"? ("this") Yes, we use the word "this" because we have just described it — our description comes just before this last sentence.
- "This" is also a pronoun, but it is a special kind. It is called a **demonstrative pronoun**. It tells us that the process we are talking about is very close — in fact, it is the one just described. Let's talk about this for a moment.
- We use the word "this" when we talk, don't we? Look at the book in my hand and the one on the shelf over there. If I want to talk about the colours of these books, for example, I would say, "This book is red." What would I say about the other book? (That book is blue.)
- Good. Why did you use "that" instead of "this"? (because it's farther away) So "this" is used when something is close? (yes) Do you see why we say "this process" in the last sentence? It's because the process has just been described — it's very close to this sentence, and everybody would know what process we are talking about.

- Adding "is" and "this" to our notes from the circle, detail E, we get the following sentence:

> This process is known as evaporation.

- We should add one more word to this paragraph. Which step of the water cycle is this? What number? (one) Let's use another word. This is the _______ step of the water cycle. What word fits here? ("first")
- Yes, this is the first step. So let's put the word "first" at the beginning of this paragraph. Now our completed paragraph reads as follows:

> First, the warmth of the sun heats bodies of water, which causes the water to rise into the air where it becomes a gas called water vapor. This process is known as evaporation.

- What word should you use to start the next paragraph? ("second") Why? (It will describe the second step of the water cycle.)
- What word will start your last paragraph? ("third")

V. FOLLOW-UP - Writing

The first paragraph of the actual description (the second paragraph of the report) having been modeled for the students, they should now be able to complete the next two paragraphs on their own. Instruct them to complete their descriptive reports, using the two paragraphs above (introductory paragraph and description of the evaporation stage) to begin their reports. They can write the last two paragraphs by themselves, using their cycle diagrams as a guide.

[Self-monitoring]

When the students have completed their reports, they edit them with their partners. They can edit them a final time when they read their reports to the teacher.

[Self-evaluation]

[Imagery]
[Elaboration]
[Deduction/induction]

[Cooperation]
[Questioning for clarification]

SAMPLE OF FINAL TEXT:

The Water Cycle

This report describes the water cycle.

First, the warmth of the sun heats bodies of water, which causes the water to rise into the air where it becomes a gas called water vapor. This process is known as evaporation.

Second, air currents carry this water vapor high into the sky, where it cools because temperatures are lower. It becomes a liquid again in the form of water droplets. This process is known as condensation.

Third, clouds are formed when many droplets collect in the same place. Larger droplets result when the water droplets begin to stick together. These become too heavy to float in the air and fall back to the earth. This process is known as precipitation. Four forms of precipitation are rain, snow, sleet, and hail.

NOTE: This general approach to the teaching of written reports can be used for a wide variety of content-area topics. Many different kinds of graphic representations can be used as the basis for organizing the subject matter: semantic webs, Venn diagrams, cycle diagrams, charts, time lines, etc. Each of these has a different semantic function, and therefore each can usually be used to teach a particular academic language function. For example, cycle diagrams and time lines are good for teaching sequencing, whereas Venn diagrams and charts can be used to teach the language needed for comparison and contrast. For a discussion of different types of graphic representations, see Chapter 5.

Lesson 5: Clouds - Science, Language Arts (T-List Procedure)

__Objectives:__

Content Objectives:

- To learn about the three different types of clouds and their characteristics
- To practise using an effective note-taking device, the T-list
- To gain skill at distinguishing between main and supporting ideas

Language Objectives:

Skills:

- Listening -	to a dictated text
- Speaking -	to exchange information
- Reading -	for information
- Writing -	note taking; elaborating from point form to sentences; producing descriptive passages based on notes

Linguistic Knowledge:

Vocabulary Development:

clouds, compose/composed, height, cirrus, cumulus, stratus, comes from (i.e., derives from), derivation, located, altitude, Latin, curl, feathery, wisp, signal, swelling, puffy, flat, plumes, moist, layer, layered, continuous, horizontal, sheet, blanket, entire, dew point, appearance, form/formed, details, main ideas, separate, thin, droplet, ice crystal, tiny, fair weather, resemble, develop, indicate, occur, originate, idiom, figurative, literal, italics, abbreviate

Structures:

- Punctuation - use of commas in lists of adjectives; use of colon to introduce a list; use of quotation marks to indicate that a word (not the thing it denotes) is being discussed
- Present tense for scientific truths
- Passive voice - *are located, are formed*
- Subject-verb agreement
- Pronouns - personal pronoun *they*; demonstrative *these*
- Prepositions - appear *as*, condense *into*, made *of*, comes *from*, *in* the form *of*, *like*, etc.
- Prefix *pre* meaning "before, in front of"

Discourse Features:

- Discourse markers *first, next, finally*
- Paragraph unity

Functions:

- Classifying
- Describing

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Imagery - using pictures of clouds to understand the different types
- Note taking - when completing T-lists
- Inferencing - guessing while taking notes
- Resourcing - using the visual as a resource
- Grouping - information about clouds
- Classifying - identifying and describing different types of clouds
- Auditory representation - while taking notes
- Summarizing - information from a text on a T-list
- Deduction/induction - when writing sentences and descriptive paragraphs
- Elaboration - expanding one aspect of the water cycle (cloud formation)

Social-Affective Strategies:

- Cooperation, Questioning for clarification, Self-talk

Materials:

- Reading passage adapted from passages in Terry Bilyk's *Let's Find Out: Exploring Science in the World Around You* (D.C. Heath Canada Ltd., 1993, 227) and Santillana *Bridge to Communication, Middle Level C, Teacher's Guide*, 220.
- Pictures of three different types of clouds (these can be found in almost any reference book on weather).
- Cloud T-list

Procedures:

Note: This lesson utilizes the **T-list Procedure** described in Chapter 3.

I. PREPARATION - Listening and Speaking

Review the water cycle using the graphic representation from lesson 4 to elaborate upon condensation and precipitation, relating these to the process of cloud formation. Ask:

- What is water vapor? (a gas)
- When the water vapor is carried high into the sky, what happens to it? (It cools.)
- Why? (because the temperature is lower high in the atmosphere)
- What happens to the water vapor when it cools? (It becomes a liquid again.)

- In what form? (water droplets)
- What is this process called? (condensation)
- What forms as a result? (clouds)
- What are clouds made of, then? (water droplets)
- Good. Another word that means the same as "made of" is "composed" — we say that clouds are **composed** of water droplets. What is this desk composed of? (wood) What is this pen composed of? (plastic) What is the verb that "composed" derives from? (compose) Yes. Do you know another word that comes from the verb "compose"? ("composition")

- Good. Let's go back to our clouds. When these tiny droplets of water begin to stick together to form larger droplets, they become heavy. What happens when they become too heavy? (They fall back to earth.)
- What is this process called? (precipitation)

- Are there different types of clouds? (yes) How many different types of clouds do you think there are? (Answers will vary.)
- Can you describe some of the different types of clouds you have seen? (Answers will vary.)
- How do you think all these clouds are different? (Answers will vary.)
- Do they all look or appear the same? (no)
- so their **appearance** is different? (yes)
- Are they all in the same place in the sky, or do some clouds seem higher or lower in the sky? (different heights)
- What does "height" mean? (how high they are) What is the root word for "height"? ("high")
- Is there another word for how high something is in the sky? When you are in an airplane, how high up do you fly? (above the clouds) Does the pilot tell you how high you are flying above the ground? (yes) What word does the pilot use for the height above the ground? (The pilot says "we will be flying at an altitude of ____ feet.")
- What is another word for "height above the ground," then? ("altitude")

- Do you think clouds have different altitudes? (yes)
- When you see the different clouds in the sky, what is the weather like? (It varies.)
- If you see the low, flat, grey clouds which cover the sky like a blanket, what kind of weather do they usually signal? (rain)
- If you see big, white, puffy clouds, what kind of weather do they signal? (nice weather)
- If you see slightly curled, white, feathery, thin wisps of clouds, what kind of weather usually follows? (The weather changes.)
- So could we say that different clouds **signal** different kinds of weather conditions? (yes)
- What does "signal" mean? (tells you something is going to happen or follow)
- Do people signal when they are driving their cars? (yes — left turn signals, right turn signals)

- Do you think all the different types of clouds are **formed** in exactly the same way? (no) Why not? (because they look or **appear** different, they **signal** different weather conditions, and they are at different **altitudes**)

- There are three basic cloud types. What do you think their names are? (cirrus, cumulus, stratus) [Draw a sketch of each as they are said.]
- Which clouds do you think are at the lowest altitude and appear like a grey blanket covering the sky? (stratus)
- Which clouds do you think are the big, white, puffy clouds? (cumulus)
- Which altitude do you think they are in? (middle)
- Which clouds are the white, feathery wisps? (cirrus)
- Where are the cirrus clouds in the sky? (highest altitude)
- What do you think determines the type of cloud? (temperature and amount of water in the air)

[Advance organization]	*[Elaboration]*
[Selective attention]	*[Imagery]*
	[Inferencing]
	[Grouping]

II. PRESENTATION - Listening and Writing

This stage focuses on the **Clouds T-list**, which is given below following a copy of the text which will be dictated to the students.

CLOUDS

There are three main types of clouds: cirrus, cumulus, and stratus.

The first type, cirrus clouds, are located in the highest altitudes. The name "cirrus" comes from the Latin word meaning "curl." These clouds appear as separate, slightly curled, white, and feathery thin wisps. They are formed very high in the atmosphere where it is too cold for water to condense into water droplets. Therefore, they are made of tiny ice crystals. Cirrus clouds often signal a change in the weather.

Next, cumulus clouds are located in the middle altitudes. The name "cumulus" comes from the Latin word meaning "swelling." These clouds appear as big, white clouds which are puffy at the top and flat at the bottom. They are formed when separate plumes of moist air rise over small areas and cool below the dew point. Cumulus clouds usually signal fair weather.

Finally, stratus clouds are located in the lowest altitudes. The name "stratus" comes from the Latin word meaning "layered." These clouds appear as continuous, horizontal sheets in the form of flat, gray layers which cover the sky like a blanket. They are formed over large areas where an entire layer of moist air cools below its dew point. Stratus clouds often signal rain or snow.

Adapted from *Let's Find Out: Exploring Science in the World Around You* by T. Bilyk.
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T-List: Clouds

Main Ideas	Details
Clouds - ___ main types	
1. __________	a. Altitude - __________
	b. Latin word meaning __________
	c. Appearance - __________
	__________
	d. Formed - __________
	- too cold to __________
	- made of __________
	e. Signal - __________
2. __________	a. Alt. - __________
	b. Lat. wd. meaning - __________
	c. App. - __________
	__________
	d. Formed - separate plumes of __________
	rise over __________
	- cool below __________
	e. Signal - __________
3. __________	a. Alt. - __________
	b. Lat. wd. meaning - __________
	c. App. - continuous __________
	- flat __________
	- like a __________
	d. Formed - over __________
	- entire layer of __________
	cools below __________
	e. Signal - __________

Summarize the new information discussed in the Preparation stage and write the key words on the chalkboard or on a transparency. Ask:

- What are the name of the types of clouds? (cirrus, cumulus, and stratus)
- How are they different? (altitude, appearance, how they are formed, and what weather they signal)

Distribute the **Clouds T-list** and discuss how to complete it. A number of different strategies can be integrated into this discussion.

Strategies Instruction:

[Organizational planning]-- *[Predicting/inferencing]--*

- What are we going to do today? (a T-list)
- How do you know? (the title)
- What is the T-list about? (clouds)
- Why do you think it is called a T-list? (looks like a big "T")
- What is on the left side of the T? (main ideas)
- How do you know? (headings or subtitles)
- What are main ideas? (the important things)
- How many main ideas will there be in this T-list? (three)
- How do you know? (three numbers)
- What do you think the three most important points or main ideas will be? (the names of the three types of clouds)
- What is on the right side of the T? (details)
- What are details? (more information)
- More information about what? (the main ideas)
- How many points are there under the details? (several)
- How many details are there beside each main idea? (five)
- How do you know? (a, b, c, d, e are listed beside each)
- What word is beside the letter "a" for each main idea? ("altitude")
- How is "altitude" abbreviated beside numbers 2 and 3? ("alt")
- What words are beside the "b's"? ("Latin word meaning")
- What is Latin? (a language) Do people speak it now? (no) When did they speak it? (long ago)
- What is after the word "Latin"? ("word meaning")
- Where do you find word meanings? (in the dictionary)
- Let's look up the word "cirrus" in the dictionary. [Note: *Webster's New Collegiate Dictionary* was used here.]
- After the word you see some square brackets. What do you see inside those brackets? ([NL, fr. L, curl])
- The "fr." is an abbreviation for a short word, a preposition. Guess what it is. ("from")
- What do you think the capital L stands for? (Latin)
- What word is after the capital L? (curl)
- How do you think "cirrus" and "curl" are related? ("Cirrus" is the Latin word meaning "curl")

- Yes. The square brackets contain information about where the word comes from. Another word for this is **derivation** — the square brackets give the derivation of the English word cirrus. It comes from the Latin word meaning "curl." [Note: Discuss the connection between "derive" and "derivation" at this point, if you wish.]
- Many English words important in science come from Latin words. If you look for a scientific word in the dictionary, the Latin derivation appears in square brackets.
- How is "Latin word meaning" abbreviated beside numbers 2 and 3? ("Lat. wd. meaning")

- What word is beside the "c's"? ("Appearance")
- How is "appearance" abbreviated beside numbers 2 and 3? ("App.")

- What is the word beside the "d's"? ("Formed")
- What is the word beside the "e's"? ("Signal")
- Are the words "Formed" and "Signal" abbreviated beside numbers 2 and 3? (no)
- Why not? (They are already short — no need to shorten them.)

- Why are these words under the "Details" side of the T-list? (They describe how the clouds are different, in several ways.)

[Selective attention]-- *[Note taking]--*
[Organizational planning]

- How do you think you are going to complete this T-list? (take notes)
- Who will give you the information? (You will read it.)
- As I read the information, what will you be listening for? (special words)
- Which words will you be listening for under "Main Ideas"? (the names of the three main cloud types)
- Which words will you be listening for under "Details"? (altitude, Latin word meaning, appearance, formed, and signal)
- What will you hear when I say those words? (the words or answers to complete the T-list)
- Look at numbers 1-d and 2-d, beside the word "Formed." What do you see? (other words, e.g., "too cold to ______________," "made of __________," "separate plumes of ____________")
- Why are those words there? (to help us)
- How will those words help you? (We will write the words you say after we hear those words)
- When you take notes, do you have time to write the complete words? (no, only parts of the words)
- What if you don't know how to spell a word? (It doesn't matter — we write only part of the word.)
- Who are those notes for? (us)

Now conduct the dictation phase of the T-list Procedure, reading the "Clouds" text aloud to the students. They listen carefully and try to complete their T-lists, using abbreviations if necessary.

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Strategy Instruction:

[Self-monitoring]--

- Did you complete the T-list? (no)
- How much of it did you complete?
- Do you want me to read it again?
- Which words will you be listening for? (the words we did not get)
- What should you do when you hear the words you already have? (check them)

Dictate the article a second time, and a third time if necessary, to ensure that the students have completed most of the details on the T-list. Each dictation should be slightly faster than the one before.

[Selective attention]
[Self-monitoring]

[Note taking]
[Auditory representation]
[Grouping]
[Inferencing]
[Summarizing]

III. PRACTICE - Speaking and Reading

Assign the students to partners or small groups. They compare their T-lists and pool information. Assign a time limit (e.g., 10 minutes). Allow the students to try spelling the words as best they can, without providing too much assistance; correct spelling will be discussed during the Evaluation stage.

[Self-evaluation]

[Cooperation]
[Questioning for clarification]

IV. EVALUATION - Speaking and Reading

After the students have completed their individual T-lists, have them dictate to you the various parts they have filled in as a class activity. Write the words in the appropriate blanks on the chalkboard or overhead transparency, focusing on the correct spelling of all the words. If the students have misspelled some of the words, this is their chance to make corrections as they compare their T-lists with the copy on the board or overhead.

Punctuation (e.g., comma usage) is integrated into this part of the lesson as the cooperatively produced T-list is being completed. Ask:

- When you are listing words describing the appearance of the clouds, what do you use? (commas)
- Why? (to separate the descriptive words)
- What part of speech are these descriptive words? Are they nouns? Verbs? (no, adjectives)
- Do you use a comma before the last adjective? (no)
- Why not? (It is the last adjective before the noun)

[Self-evaluation]

[Deduction/induction]

[Cooperation]

V. FOLLOW-UP - Writing

When the T-lists have been completed, teach the students how to transform the main ideas and details into descriptive paragraphs. Discuss, demonstrate, and model this writing activity with the class to ensure their success when they are writing their descriptive paragraphs. They use their T-lists and consciously carry out the necessary grammatical transformation, as demonstrated below.

Strategy Instruction:

[Organizational planning]-- *[Deduction/induction]--*

- What is the title? (Clouds)
- Where is the title on the T-list? (at the top of the page)
- What does the title start with? (capital "C")
- How many paragraphs are you going to write? (three)
- How do you know? (three main ideas)
- What are the three paragraphs going to be about? (the three types of clouds)
- What side of the T-list are these three types of clouds listed under? (left side - main ideas)
- What do you have to remember to do with each paragraph? (indent)
- How do you indent? (leave a space of 2 or 3 centimetres)

- What will the first paragraph be about? (cirrus clouds)
- How many details do we have? (five)
- What will the first sentence be about? (altitude) Why? (It is the first detail and has the letter "a" beside it.)
- How should we write the first sentence? Let's look at our T-lists and write it together.
- What will the first words or the subject of the first sentence be? (Cirrus clouds)
- Where are cirrus clouds found? (at the highest altitudes)
- What word should we use to tell "where"? ("located")
- Which verb should we use with "located," "are" or "is"? ("are") Why? (is = 1, are = 2+)
- How should we connect "Cirrus clouds are located" to "highest altitudes"? (Use "at.")
- What is the little joining word "at" called? (preposition)
- What is the root word of "preposition"? ("position")
- What does "position" mean? (where something is placed)
- What is the prefix? ("pre")
- What does the prefix "pre" mean? (before, in front of)
- What does the preposition "at" do in this sentence? (connects the subject "cirrus clouds" with "the highest altitudes")
- Does the preposition "at" show a relation between "cirrus clouds" and "highest altitudes"? (yes)
- How? (It tells where cirrus clouds are located.)
- What is the purpose of a preposition? (It shows the relation between a noun and some other word in the sentence.)
- What other word do we have to add, to make this into a good English sentence? ("the")

- Where do we write "the"? (in front of "highest altitudes")
- Yes. So we get:

Cirrus clouds are located at the highest altitudes.

- What will the second sentence be about? (Latin word meaning)
- Let's write it together. What will the subject or first word be? ("Cirrus")
- Look at your T-lists. How will we combine the words "cirrus" to "Latin word meaning"? (Use the verb "comes")
- What preposition should we use to show the relation between "'Cirrus' comes" and "Latin word meaning"? (from)
- What word should we write in front of "Latin word meaning"? ("the")
- Which word from our T-list would follow "the Latin word meaning"? ("curl")
- Good. So we get:

"Cirrus" comes from the Latin word meaning curl.

- Notice something different or unusual about the sentence I have written here. The word "cirrus" has punctuation marks around it. Do you know what these are called? (quotation marks)
- Yes. Why do I use quotation marks here? Do you have any idea? [Note: The students may have difficulty answering this question. If they do, try to give them a clue through a few examples like the following:

  - An elephant is a large animal. The word "elephant" starts with the letter e.
  - A mile is a long way to run, but the word "mile" is not long.

  Eventually the students should come to see that quotation marks are used when we are talking about the word itself, not the thing it denotes.]
- In our sentence, when we say "cirrus" comes from the Latin word meaning curl, are we talking about cirrus clouds or about the word "cirrus"? (the word)
- Yes. And when we are talking about a word itself rather than what it means, we must put the word in quotation marks.

- What will the third sentence be about? (appearance)
- What part of speech is "appearance"? (noun)
- What is the root word of "appearance"? ("appear")
- What part of speech is "appear"? (verb)
- If we use the verb "appear," what would the subject be? (Cirrus clouds)
- We have already used the subject "Cirrus clouds" in the first two sentences. What else could we use instead of these words? ("these clouds" or "they")
- What do "these clouds" or "they" take the place of? (Cirrus clouds)
- What part of speech are "these" and "they" if they take the place of nouns? (pronouns)
- Let's write the subject and verb:

These clouds appear . . .

- What little joining word could we use to connect "appear" to the details listed beside "appearance" on the T-list? ("as")
- Good. We often use "as" with the word "appear."

- Can we now add the rest of the information listed under the details beside "appearance"? (yes)
- What do you have to remember to insert or put between the adjectives describing the appearance? (commas)
- What conjunction do we add before the last two adjectives? (and)
- Good. So we get:

These clouds appear as separate, slightly curled, white, and feathery thin wisps.

- What is the fourth sentence about? (how the cirrus clouds are formed)
- What pronoun could we use for the subject? ("they")
- What does the pronoun "they" take the place of? (cirrus clouds)
- Do we use "is" or "are" with "formed"? ("are") Why? ("They" means more than one.)
- How many sentences will you write for how the cirrus clouds are formed? (three)
- Could we combine two sentences? (yes)
- What joining word could we use to join "very high up" with "too cold to condense into water droplets"? ("where") Yes, so we get:

They are formed very high up where it is too cold to condense into water droplets.

- What are cirrus clouds made of? (tiny ice crystals)
- Why? (too cold to condense into water droplets)
- What words could we use to show the ice crystals are formed as a result of being too cold to condense into water droplets? (as a result) Good. So our next sentence should be:

As a result, they are made of tiny ice crystals.

- What will the last sentence of this paragraph be about? (signals)
- About what? (the weather)
- What should the subject be if this is the last sentence of the paragraph? ("Cirrus clouds")
- What is the verb? ("signal")
- What do cirrus clouds signal? (a change in the weather)
- Let's write the sentence:

Cirrus clouds signal a change in the weather.

Now discuss the first paragraph in its entirety, focusing on the fact that many of the words in the paragraph come from the T-list itself.

- Which words come from your T-list? Let's underline them. You tell me which words to underline, and I'll underline them on the board (or transparency) for you.

Cirrus clouds are located at the highest altitudes. "Cirrus" comes from the Lating word meaning curl. These clouds appear as separate, slightly curled, white, and feathery thin wisps. They are formed very high up where it is too cold to condense into water droplets. As a result, they are made of tiny ice crystals. Cirrus clouds signal a change in the weather.

Discuss the paragraph carefully, emphasizing the structures and added words that will help the students to write their own paragraphs on cumulus and stratus clouds. Mention some alternative structures or words they can use, and write these on the board or transparency as they are discussed. E.g.:

(1) - For detail number 1, what words did we add to the first sentence? ("are located in")
- What other words could we use instead of "are located in"? ("are found in," "occur in")

(2) - What words did we add to detail number 2 in the second sentence? ("comes from")
- what other words could we use instead? (e.g., "derives from," "is derived from")

(3) - What words did we add to detail number 3 in the third sentence? ("appear as")
- What other words could we use? ("looks like," "resembles")

(4) - Which verb did we use for detail number 4? ("are formed")
- What else could we use? ("are made")

(5) - What verb did we use for detail number 5 in the last sentence? ("signal")
- What else could we use? ("mean," "indicate")

[Deduction/induction]

EXTENDED ACTIVITY:

The students write their own descriptive paragraphs on cumulus and stratus clouds. When they have completed their first drafts, they edit them with the teacher. Then they draw a sketch or picture of each cloud and write the descriptive paragraphs at appropriate places within their sketches (e.g., inside or under the clouds).

At this point the students could be introduced to some interesting idioms associated with clouds. Some examples are:

a) Every cloud has a silver lining.
b) on cloud nine
c) head in the clouds
d) a dark cloud hanging over me
e) clouding your judgement
f) in a fog

The students can write the idioms around or inside their cloud diagrams. This is a good opportunity to teach the difference between **literal** and **figurative** language. Literal meanings are expressed by the descriptive paragraphs and various figurative meanings are expressed by the idioms.

LEARNING LOG FOR LESSONS 1-5

VOCABULARY I KNOW:

Weather Nouns

___ weather
___ condition
___ atmosphere
___ weather report
___ forecast
___ temperature
___ degrees
___ Celsius
___ Fahrenheit
___ wind
___ windchill
___ sky
___ rainfall
___ snowfall
___ precipitation
___ flurry
___ blizzard
___ thermometer
___ meteorologist
___ low
___ high
___ cycle
___ movement
___ air
___ gas
___ water vapor
___ surface
___ evaporation
___ liquid
___ condensation
___ clouds
___ formation
___ precipitation
___ rain
___ snow
___ sleet
___ hail
___ air currents
___ droplets
___ drop
___ cirrus
___ cumulus
___ stratus
___ dew point
___ ice crystal
___ fair weather

Experiment Nouns

___ apparatus
___ materials
___ experiment
___ objective
___ observation
___ conclusion
___ diagram
___ chart
___ bar graph
___ beaker
___ spout
___ symbol
___ cubes
___ water
___ steam
___ heat
___ time
___ process
___ data

Miscellaneous Nouns

___ information
___ kind
___ newspaper clippings
___ details
___ definition
___ term
___ purpose
___ ocean
___ lake
___ river
___ stream
___ derivation
___ altitude
___ Latin
___ curl
___ wisp
___ plume
___ layer
___ sheet
___ blanket
___ appearance
___ derivation

Academic English Terms

___ colon
___ personal
___ impersonal
___ imperative
___ tense
___ passive
___ pronoun
___ demonstrative adjective
___ demonstrative pronoun
___ cycle diagram
___ main idea
___ detail
___ heading
___ subheading
___ indent
___ paragraph
___ report
___ idiom
___ figurative
___ literal
___ italics

Weather Verbs

___ predict
___ forecast
___ heat
___ rise
___ cool

Experiment Verbs

___ affect
___ check
___ record
___ lower
___ rise/rose
___ fall/fell
___ label
___ cause

Miscellaneous Verbs

___ include
___ exclude
___ contain
___ stand for
___ define
___ rise
___ set
___ dictate
___ form
___ float
___ increase
___ continue
___ collect
___ stick
___ repeat
___ compose
___ locate
___ signal
___ swell
___ separate
___ resemble
___ develop
___ indicate
___ occur
___ originate
___ derive
___ abbreviate

Adjectives

___ calm
___ windy
___ sunny
___ clear
___ cloudy
___ mainly
___ scattered
___ occasional
___ warm
___ ice
___ boiling
___ descriptive
___ feathery
___ puffy
___ flat
___ moist
___ continuous
___ horizontal
___ entire
___ thin
___ tiny
___ plus
___ minus

Adverbs

___ sometimes
___ usually
___ often
___ always
___ constantly

Discourse Markers

___ however
___ in other words
___ in contrast
___ both
___ also
___ first
___ second
___ third
___ fourth
___ finally
___ causes
___ as a result
___ resulting in
___ it
___ they
___ this
___ these

CONTENT

I can:

___ name and identify the important parts of a weather report
___ explain the parts of a weather forecast
___ perform and report a science experiment
___ record and graph observations
___ draw conclusions based on data
___ understand how cold, warm, and hot water affect temperature change rates
___ name and identify the parts of the water cycle
___ explain evaporation, condensation, and precipitation
___ use my prior knowledge to complete a cycle diagram
___ name the three types of clouds and describe their characteristics
___ distinguish between main and supporting ideas when completing a T-list

LANGUAGE

I can:

___ report information by writing declarative sentences
___ define weather terms
___ write definitions in different ways
___ write or report a science experiment using the headings: Objective, Apparatus, Method, Observations, Conclusion, Diagram
___ write a descriptive report of factual information, in paragraphs, from a cycle diagram
___ write descriptive paragraphs using the main ideas and details on a T-list
___ combine sentences using a cycle diagram, T-list, or questions
___ use commas when listing nouns or writing several adjectives in sequence
___ write sentences in the passive voice
___ understand the difference between literal and figurative language
___ add suffixes to verbs to make nouns

LEARNING STRATEGIES

Using metacognitive strategies (those on the blue sheet), I can:

___ plan what I will do before I do it
___ monitor the correctness of my work as I am doing it
___ evaluate my work after I have done it
___ look over the title, headings, and pictures in a reading passage before I read it (in advance), to organize my thoughts
___ plan how to learn new information or write down new information I learn

Using cognitive strategies (those on the green sheet), I can:

___ use pictures to help me understand
___ use other resources like newspaper forecasts to obtain new information
___ take notes from a dictation or other listening activity
___ group information on a chart, a cycle diagram, or a T-list
___ elaborate upon my prior knowledge to complete new tasks
___ predict what will happen and why
___ use inferencing or guessing to fill in the missing parts
___ summarize information on charts, graphs, cycle diagrams, and T-lists

Using social-affective strategies (those on the pink sheet), I can:

___ cooperate to work with others
___ ask questions to get information

Lesson 6: Hygrometer Experiment (Dictated Instructions Technique)

Objectives:

Content Objectives:

- To construct a hygrometer to measure relative humidity
- To perform and report a science experiment incorporating the headings: *Objective*, *Apparatus*, *Method*, *Observations*, *Conclusion*, and *Diagram*

Language Objectives:

Skills:

- Listening - during discussions; for oral instructions during the note taking phase
- Speaking - to exchange information and assistance, especially when the students are performing the experiment in pairs or groups
- Reading - their notes, when discussing the experiment method and performing the experiment
- Writing - the various parts of a science experiment report

Linguistic Knowledge:

Vocabulary Development:

humid, damp, relative humidity, hygrometer, oatmeal carton, rubber bands, cotton, shoestring, slot, slide, slip, fit, calculate, determine, record, chart, bar graph, consecutive

Structures:

- Imperative forms of verbs
- Infinitive forms of verbs, used when stating objectives
- Passive voice
- Past participles — regular (with -ed suffix) and irregular (*cut-cut, put-put, slide-slid, read-read, make-made*)
- Subject-verb agreement
- Past tense of *to be* — *was* and *were*
- Prepositions
- Punctuation — use of colon when listing, or after headings; using commas in lists

Discourse Features:

- Sequential markers *first, second, third*, etc; *last, finally*
- Format of a science experiment report

Functions:

- Stating objectives using infinitive forms
- Listing (apparatus)
- Reporting a science experiment in its entirety

Learning Strategies:

Metacognitive Strategies:

- Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Note taking - during the dictation
- Inferencing - as they are filling in the blanks when taking notes
- Deduction/induction - when writing the experiment report
- Imagery - using science equipment and drawing a diagram
- Elaboration - of prior knowledge from lessons 3 and 4 on the water cycle
- Transfer - of skills in taking notes (in DIT activity) and writing an experiment report
- Auditory representation - when taking notes

Social-Affective Strategies:

- Cooperation, Questioning for clarification, Self-talk

Materials:

- Apparatus for the experiment. For each pair of students:
  - one oatmeal carton
  - two large rubber bands
  - two indoor/outdoor thermometers
  - scissors
  - a piece of wide white cotton shoestring about 15 cm long
  - a pill bottle or baby food jar
  - ruler
  - water
- Method instructions sheet for distribution to the students, based on hygrometer experiment in *Weather, Electricity, Environmental Investigations* (1982, the Learning Works Inc.). See end of lesson for two different versions of this sheet.
- Copies of Relative Humidity Chart from the same source (see end of lesson)

Procedures:

Note: This lesson utilizes the **Dictated Instructions Technique (DIT)** explained in Chapter 3 and used previously in Lesson 2 of this unit (for the Temperature Experiment). In this lesson we present a series of general steps for the DIT, illustrating these steps in some cases with reference to the construction and operation of a hygrometer. In future lessons using the DIT, it will be unnecessary to go through all these steps in detail; those lessons will contain only the basic information needed for application of the technique.

The "general steps" described below are 12 in number, and are easy to recognize because they appear in smaller type.

It should be emphasized that the basic procedure of the DIT, as summarized in the 12 steps below, can be modified in many ways to suit the particular experiment being performed. **Teachers should feel free to decide which steps to omit, expand, or revise for each lesson employing the DIT.**

I. PREPARATION - Listening, speaking, and writing

1. Prepare the students for the experiment to follow by reviewing the science topic or question it aims to investigate. Ask questions which will activate their current knowledge schemata and lead to the formulation of an experiment objective (what the students will try to do, or try to find out about the topic or question under discussion). Using the students' ideas and contributions as far as possible, write (on the chalkboard) key words and phrases that can subsequently be used to construct a formal statement of the experiment objective (e.g., *determine, discover, measure, construct*).

To introduce this particular experiment, it would be advisable to review the water cycle from Lessons 3 and 4, recalling the process of **evaporation** and focusing on the fact that the air can contain water vapor. Discuss the fact that the air can feel more **humid** or **damp** at certain times. In other words, the air can sometimes contain a great deal of water vapor. Ask the students if the weather is often like that in their countries of origin, especially at certain times of year.

Then introduce the term **relative humidity**, which is a measure of the amount of water vapor in the air. (Note: There is no need to define the term formally at this time. Relative humidity is actually the ratio of the amount of water vapor actually present in the air to the greatest amount possible at the same temperature, expressed as a percentage.) Write the words *relative humidity* on the chalkboard.

Ask:

- What do you think we are going to measure today? (relative humidity)
- How can we do that? (don't know)
- We will need a special instrument to measure relative humidity. It's called a **hygrometer**. We don't have any hygrometers in the school, so what will we have to do? (buy one?) No. What else could we do? (make one?) Yes, that's what we'll do. In fact, you're going to work in pairs, and each pair will make a hygrometer.
- Do you know another word for "make"? (construct) [Write this on the board.] What are you going to do? (construct a hygrometer) [Write this on the board.]
- After you construct your hygrometer, what will you do with it? (use it) For what? (to measure the relative humidity) [Write this on the board.]
- What kind of activity will this be, constructing and using a hygrometer? (an experiment) Yes, and what else will you have to do when you perform this experiment? Do you remember what you did for the Temperature Experiment? (write a report)

2. Review the 6 parts of a science experiment report, writing key vocabulary items on the board and explaining what they mean: *Objective, Apparatus, Method, Observations, Conclusion, Diagram.* The students will already be familiar with these terms from Lesson 2 of this unit (Temperature Experiment). Tell them that these will be the parts of their report, beginning with the objective.

3. Returning to the experiment objective, use the key words on the board (from step 1) to write a formal statement of the objective, using student suggestions as far as possible. (Since the objective will likely begin with an infinitive, explain to the students that this is not a full sentence; it is a conventional way of stating an objective.) Tell the students to begin the experiment report on a blank page of their notebooks. Entertain suggestions about a title, and choose the appropriate one; have them copy it at the top of their page. Then instruct them to write the subheading *Objective:* followed by the formal statement on the board.

Strategy Instruction:

[Deduction/induction]--

Ask:

- Which part of an experiment report tells what we want to do, or find out? (the objective)
- What is the objective of this experiment? (construct a hygrometer) And? (use it to measure the relative humidity) [Note: These phrases are already on the board, from step 1.]
- I'll write the word "Objective" on the board. What should I put after it? What punctuation mark? (colon) Why? (tells something is coming after)
- What is our objective? What words should I use? Do you remember what we did in the Temperature Experiment? (use an infinitive) So what is the objective? (to construct and use a hygrometer) For what? (to measure the relative humidity) Suppose I start with the words "to construct a hygrometer and." What comes next? Should I write, "use a hygrometer to measure the relative humidity"? [Write all this on the board:]

  Objective: to construct a hygrometer and use a hygrometer to measure the relative humidity.

- You know, there's something wrong with this. It's the word "a" in front of the second "hygrometer." I should use a different word — what is it? ("the") Why? (because hygrometer has already been mentioned) So we have:

  Objective: to construct a hygrometer and use the hygrometer to measure the relative humidity.

- But we can make this shorter still. We can take out "the hygrometer" and replace it with one short word. What is it? ("it") What kind of word is "it"? (a pronoun) What is a pronoun? (a word that takes the place of a noun) So we have, finally:

  Objective: to construct a hygrometer and use it to measure the relative humidity.

- I want you to write this in your notebooks, as part of your experiment reports. But before you write it, you have to write something else on your page. What is it? (the title) What should this be? (hygrometer experiment) Good. I'll write that on the board for you. What must I remember to do when I write it? (start with capital letters) Why? (It's a title.) [Write: **Hygrometer Experiment**] Copy this at the top of your page, in the centre. Then copy the objective. Should you leave a line between them? (yes)

4. Show, discuss, identify, and write down the names of the equipment they will use in performing the experiment. Instruct them to write the subheading *Apparatus:* and list the equipment to be used. Advise them to listen carefully for these key words in the dictation activity to follow. The students are now prepared for the experiment: they know the objective and apparatus, and have begun their formal experiment reports.

Apparatus: one oatmeal carton, 2 large rubber bands, 2 thermometers, scissors, a piece of wide white cotton shoestring about 15 cm long, a pill bottle (or baby food jar), a ruler, water.

[Organizational planning]
[Selective attention]

[Predicting/inferencing]
[Elaboration]
[Imagery]
[Deduction/induction]

II. PRESENTATION - Listening and writing

5. Distribute a worksheet containing the steps of the experiment (method) numbered 1, 2, 3, etc., but with many of the words replaced by blank spaces. The students will fill in the blanks from the dictation in step 6. The number of blanks to leave in each step, as well as the types of words to be omitted, depend on the proficiency of the students. Initially, you may wish to omit only the sentence-initial imperative verb of each instruction plus certain key nouns (especially the apparatus terms they have learned). In another experiment, omit verbs and prepositions. For more advanced students, omit verbs and entire phrases (e.g., noun phrases consisting of nouns preceded by articles or other determiners, or entire prepositional phrases).

See **the end of this lesson** for:

a) Complete text of instructions to be dictated to students (i.e., experiment method);
b) Students' worksheet — same as text in (a), but with selected words omitted. Two different versions are included here:

Version 1: Sentence-initial imperative verbs are omitted, as well as most nouns.
Version 2: Sentence-initial imperative verbs are omitted, as well as all prepositions.

As noted in (5) above, other variations are possible.

Before proceeding to the dictation in step 6, review the procedures of the Dictated Instructions Technique. Refer to Lesson 2 (Temperature Experiment) to refresh the students' memories.

Strategy Instruction:

[Organizational planning]--

- Look at your worksheets. How many steps are we going to do in this experiment? (14)
- How do you know? (14 numbers)
- Are there any instructions on your sheets? (yes) Are they complete? (no)
- What is missing? (words) How do you know? (blanks)
- How will you know what to write in the blanks? (You will read them to us.)
- What will you do? (take notes)
- The different steps **instruct** you what to do. What are they called? The word I want comes from the word "instruct." (instructions) I will read them aloud. What is another word meaning "read aloud"? (dictate)
- When I read and you take notes of what I read, what do we call this? (dictated instructions)
- How will you know when I am reading step number 1? (You will say "first")
- What will I say for number 2? ("second")
- Do you all know what you are going to do? (yes) The organization of your work is well planned, isn't it? (yes) We call this strategy **organizational planning**. It means planning how you are going to complete an assignment or task. Which strategy sheet could we add this to? (blue sheet)

[Selective attention]-- *[Note taking]--*

- When you take notes as I dictate the instructions, what will you write? (what you say)
- What if you don't know how to spell the words. What will you do? (write part of a word, or the first letter)
- What would you write for the word "thermometer," for example? ("th" or "ther")
- Would you remember what "th" or "ther" stands for later, when you are working in your groups? (yes) Who are the notes for? (us)

6. Dictate the method instructions to the students, using the imperative form of verbs and making use of discourse cues like *first, second, ..., next,* and *finally*. The student fill in the blanks in their instruction sheets, using abbreviations if necessary. Dictate the passage a second time, to allow them a chance to fill in gaps and check their work.

Strategy Instruction:

[Self-monitoring]--

- [After the first reading] How did you do? Did you complete all the notes? (no)
- Do you want me to read it again? (yes)
- What should you listen for this time? (what we don't have)
- If you have completed the notes, what should you do? (check our notes as you read)

[Organizational planning] *[Note taking]*
[Selective attention] *[Auditory representation]*
[Self-monitoring] *[Inferencing]*

III/IV. PRACTICE/EVALUATION - Reading and speaking

7. Group the students in pairs or small groups. Instruct them to compare their notes and pool information, expanding abbreviations to produce complete and accurate instruction sheets. Assign a time limit (e.g., 10 min.). Circulate to provide assistance.

[Self-evaluation]

[Deduction/induction]

[Cooperation]
[Questioning for clarification]

8. Ask individual students to dictate steps of the method from their completed sheets, and write these on an overhead transparency of their worksheet, filling in the same blanks as the students did. Discuss spelling and grammatical structures where pertinent.

[Self-evaluation]

[Deduction/induction]

9. Instruct the students (in their pairs or small groups) to go ahead and perform the experiment, following the instructions on their sheets. If appropriate to the experiment, have them record observations on a separate sheet (preferably one prepared for them, containing a scheme for recording information, e.g., a chart).

   For the hygrometer experiment, no special chart is necessary for recording observations. According to step 13 of the instructions sheet (see end of lesson), the students are to record the outside relative humidity in the morning and afternoon for three consecutive days. They can do this in their notebooks.

   But despite the fact that a standardized chart is unnecessary here, the students should be advised that it will be necessary to record a number of pieces of information when making each observation. These are:

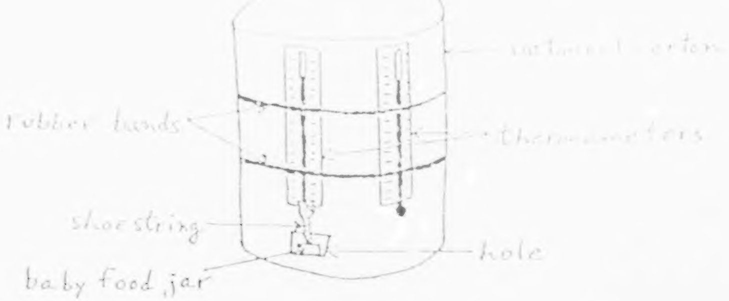
   1. The date and time of each observation.
   2. The temperatures of both the dry bulb and wet bulb thermometers.
   3. The difference between the wet bulb reading and the dry bulb reading.
   4. The relative humidity, as determined from the reference chart (see end of lesson).

10. When the experiment is completed and observations recorded, have students draw a labeled diagram of the experiment setup.

[Selective attention]
[Self-monitoring]

[Transfer]
[Note taking]
[Imagery]

[Cooperation]
[Self-talk]



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V. FOLLOW-UP - Writing

11. Using the previously completed transparency of the method (instructions), demonstrate how each step can be changed from the imperative form to the passive voice. Tell the students they must use the passive because they want their report to be impersonal, avoiding "I" or "we." During the demonstration, focus on structural points like:

    a) using the object of the imperative verb as the subject of the new sentence;
    b) how the passive verb is formed, using:
        - a form of the verb *to be* (*was* or *were* — discuss subject-verb agreement);
        - the past participle of the imperative verb. (Discuss regular past participles, which employ the *-ed* suffix, and supply correct forms for all irregular verbs in the list).

    Use arrows to show how the imperative sentences are transformed. Model the first few on the transparency, producing the first few numbered sentences of the *Method*, which the students can now begin entering on their experiment reports (after *Apparatus*). Then let the students complete the formal write-up of the method, all in the passive. They can then check each others' work when completed.

- Look at the first instruction on your sheet. [See end of lesson. Note that Version 1 of the students' instruction sheet is used here.] Here is what you have [indicate instruction number 1 on the overhead transparency]:

1. ______*Cut*__ a __*slot*__ in one __*side*__ of the __*oatmeal carton*__ about 5 centimetres from the __*bottom*__.

- This instruction is written in the **imperative** form. How do you know this? (It tells us what to do.)
- Do you remember what we did in the Temperature Experiment? We changed the instructions from the imperative to the **passive voice**. Look at the first instruction. What will be the subject of the passive sentence? ("a slot") Let's move it — I'll draw an arrow.
- What will the passive verb be? Remember, we need a form of the verb "to be" plus what? (past participle)
- You are reporting an experiment that you have completed. Should the verb be in the present tense or the past tense? (past) So what should we use, *was* or *were*? (was) Why? (agrees with "slot," which is singular)
- Do you know the past participle of "cut"? It's irregular. (cut)
- Here's what we get. [The changes can be demonstrated one by one, as they are discussed.]

1. ↓ was __*Cut*__ a __*slot*__ in one __*side*__ of the __*oatmeal carton*__ about 5 centimetres from the __*bottom*__.

- This gives:

1. A slot was cut in one side of the oatmeal carton about 5 centimetres from the bottom.

- Look at instruction number 2.

2. *Put* the *rubber bands* around the *carton*.

- Let's change this to the passive voice. What will the new subject be? ("the rubber bands")
- Which form of "to be" will we use here? ("were") Why? (because "rubber bands" is plural)
- What is the past participle of "put"? It's irregular. ("put")
- So we get:

2. were *Put* the *rubber bands* around the *carton*.

- And our passive sentence is:

2. The rubber bands were put around the carton.

- Open your notebooks to your experiment reports. What is the title? (Hygrometer Experiment) Which parts have you written so far? (Objective and Apparatus)
- What comes next? (Method) Write this as your subheading, followed by what? (a colon)
- Then write the numbers 1 and 2, followed by the passive sentences we have derived.

- You should be able to change the rest of the instructions yourself. If you have any problems, ask me and I'll help you. You may have trouble with some of the irregular verbs here, so use this list to help you. The first column contains the imperative forms of the irregular verbs, and the last column gives the past participles. [Instead of giving the students a list, you may prefer to simply write the irregular past participle forms beside the appropriate numbers on the transparency.]

slide	slid
read	read
make	made

- All the other imperative verbs are regular. How do you form their past participles? (add "-ed") What about a verb like "slip"? What is its past participle? ("slipped") What do you have to do here, besides adding "-ed"? (double the "p") There is another verb like this in the list — watch out for it. [Note: It is *fit - fitted*.]

Note: The amount of instruction and guidance provided to the students here depends, of course, on their proficiency level. With some classes it may be advisable to go through some more examples, perhaps even the entire set of instructions, demonstrating in each case how to convert to the passive form.

Whatever the level of the class, however, it is probably a good idea to have the students write out the method section (i.e., the complete list of passive sentences) on a separate sheet of paper before having them add this to their experiment reports. There are bound to be some errors in the transformed sentences, and these should be checked and corrected (through group work or by the teacher) before the final version is recorded.

12. The *Observations* and *Conclusion* can subsequently be discussed and entered, completing their reports. As a final step, students can cut out their reports, diagrams, and observation charts and glue them onto coloured construction paper to produce an attractive end-product.

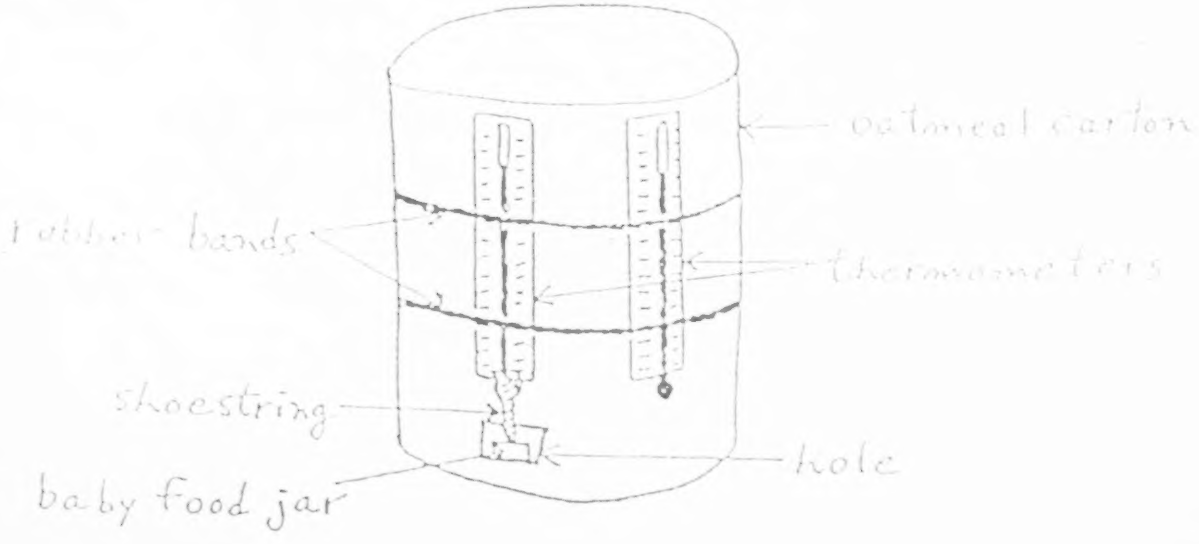
[Self-evaluation]	*[Deduction/induction]* *[Elaboration]* *[Transfer]*	*[Cooperation]*

Method Instructions

CONSTRUCTING AND USING A HYGROMETER

Instructions (Method)

1. Cut a slot in one side of the oatmeal carton about 5 centimetres from the bottom.
2. Put the rubber bands around the carton.
3. Slide the thermometers under the rubber bands.
4. Move one thermometer above the slot.
5. Slip one end of the shoestring through the slot.
6. Fit the other end of the shoestring over the bulb of one thermometer.
7. Fill the baby food jar or pill bottle half full of water.
8. Put it inside the carton.
9. Place the end of the shoestring in the water.
10. Add more water as needed to keep the string wet.
11. Read the temperatures of the dry bulb and wet bulb thermometers.
12. To calculate the relative humidity, subtract the wet bulb reading from the dry bulb reading. Then determine the relative humidity from this chart.
13. For three consecutive days, record the outside relative humidity in the morning and afternoon.
14. Make a bar graph to show the results.



Method Instructions Distributed to Students for DIT (Version 1)

CONSTRUCTING AND USING A HYGROMETER

1. ________ a ________ in one ___________ of the ___________________________ about 5 centimetres from the ____________.
2. ________ the ______________________ around the __________.
3. ________ the ________________ under the ____________________.
4. ________ one ________________ above the ________.
5. ________ one ________ of the _____________ through the ________.
6. ________ the other ________ of the _______________ over the ________ of one _______________.
7. ________ the baby food ________ or pill __________ half full of __________.
8. ________ it inside the ____________.
9. __________ the ________ of the _____________ in the __________.
10. ________ more __________ as needed to keep the __________ wet.
11. ________ the ___________________ of the dry ________ and wet ________ ______________________.
12. To calculate the ____________________________, ______________ the wet bulb _____________ from the dry bulb _______________. Then _______________ the _____________________________ from this __________.
13. For three consecutive ________, _____________ the outside relative humidity in the _____________ and ________________.
14. ________ a _____________________ to show the _______________.

Note: Items 11-14 may be omitted here and used in a subsequent "observation lesson."

Dry Bulb Temperature, °C

Difference Between Dry Bulb and Wet Bulb Temperature, °C	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	86	85	87	87	88	88	89	89	90	90	90	90	90	91	91	91	92	92	92	92
2	72	73	74	75	76	77	78	78	79	79	80	81	81	82	82	83	83	83	84	84
3	58	60	62	63	64	66	67	68	69	70	71	71	72	73	74	74	75	76	76	77
4	45	48	50	51	53	55	56	58	59	60	61	63	64	65	65	66	67	68	69	69
5	33	35	38	40	42	44	45	48	50	51	53	54	55	57	58	59	60	61	62	62
6	20	24	26	29	32	34	36	39	41	42	44	46	47	49	50	51	53	54	55	56
7	7	11	15	19	22	24	27	29	32	34	36	38	40	41	43	44	45	47	48	49
8				8	12	15	18	21	23	26	27	30	32	34	36	37	39	40	42	43
9						6	9	12	15	18	20	23	25	27	29	31	32	34	35	37
10									7	10	13	15	18	20	22	24	25	28	30	31
11											6	8	11	14	16	18	20	22	24	26
12														7	10	12	14	17	19	20

Source: *Weather, Electricity, Environmental Investigations.* The Learning Works, 1992, P.O. Box 6187, Santa Barbara, CA 93160 800/235-5767

Method Instructions Distributed to Students for DIT (Version 2)

CONSTRUCTING AND USING A HYGROMETER

1. ________ a slot ____ one side _____ the oatmeal carton about 5 centimetres ______ the bottom.
2. ________ the rubber bands ________ the carton.
3. ________ the thermometers ________ the rubber bands.
4. ________ one thermometer ________ the slot.
5. ________ one end _____ the shoestring ________ the slot.
6. ________ the other end ______ the shoestring ________ the bulb ______ one thermometer.
7. ________ the baby food jar or pill bottle half full _____ water.
8. ________ it ________ the carton.
9. ________ the end ______ the shoestring ______ the water.
10. ________ more water as needed to keep the string wet.
11. ________ the temperatures ______ the dry bulb and wet bulb thermometers.
12. To calculate the relative humidity, ____________ the wet bulb reading _______ the dry bulb reading. Then _____________ the relative humidity _______ this chart.
13. _____ three consecutive days, ___________ the outside relative humidity _____ the morning and afternoon.
14. ___________ a bar graph to show the results.

Note: Items 11-14 may be omitted here and used in a subsequent "observation lesson."

Dry Bulb Temperature, °C

Difference Between Dry Bulb and Wet Bulb Temperature, °C

	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	86	86	87	87	88	88	89	89	90	90	90	90	90	91	91	91	92	92	92	92
2	72	73	74	75	76	77	78	78	79	79	80	81	81	82	82	83	83	83	84	84
3	58	60	62	63	64	66	67	68	69	70	71	71	72	73	74	74	75	76	76	77
4	45	48	50	51	53	55	56	58	59	60	61	63	64	65	65	66	67	68	69	69
5	33	35	38	40	42	44	46	48	50	51	53	54	55	57	58	59	60	61	62	62
6	20	24	26	29	32	34	36	39	41	42	44	46	47	49	50	51	53	54	55	56
7	7	11	15	19	22	24	27	29	32	34	36	38	40	41	43	44	46	47	48	49
8				6	12	15	18	21	23	26	27	30	32	34	36	37	39	40	42	43
9						6	9	12	15	18	20	23	25	27	29	31	32	34	36	37
10									7	10	13	15	18	20	22	24	26	28	30	31
11											6	8	11	14	16	18	20	22	24	26
12														7	10	12	14	17	19	20

Source: *Weather, Electricity, Environmental Investigations.* The Learning Works, 1992, P.O. Box 6187, Santa Barbara, CA 93160. 800/235-5767

Lesson 7: Forms of Precipitation - Science, Geography, Language Arts (T-List Procedure)

Objectives:

Content Objectives:

- To learn the five different types of precipitation and their characteristics
- To practise using an effective note taking device, the T-list
- To gain skill at distinguishing between main and supporting ideas
- To write an expository essay on the forms of precipitation

Language Objectives:

Skills:

- Listening - for specific information in a dictated text
- Speaking - to exchange information when checking T-lists
- Reading - for information
- Writing - note taking; elaborating from point form to sentences; producing descriptive passages based on notes; writing an expository essay

Linguistic Knowledge:

Vocabulary Development:

precipitation, liquid, freezing, frozen, drizzle, rain, sleet, snow, hail, description, formed, approximate, temperature, effects, millimetre, diameter, drop, float, droplet, rather, splash, still (adj), breeze, fog, collide, drift (v), plus, minus, degrees Celsius, damp, dampness, approximately, bump, beneficial, flood, ice, on contact, exactly, extremely dangerous, icy conditions, streets, roads, points, branches, crystal, flake, snowflake, low, moist, level, blizzard, "white out," blocked roads, layer, ranging, current, air current, stick (v), hailstone, serious, depending (on), damage, property, idioms, figurative, literal

Structures:

- Punctuation - use of commas in lists of adjectives; use of the colon to introduce a list
- Present tense for scientific truths
- Passive voice - e.g., *is/are formed*
- Modal verbs *can* and *may* to express possibility of occurrence
- Subject-verb agreement
- Nouns in apposition, e.g., "the first type, *drizzle*, ..."
- Pronouns - personal pronouns *they*, *it*; demonstrative pronoun *these*

- Prepositions used with certain verbs - floats *to*, splash *on*, bumping *into*, ranging *from*, fall *through*, turn *into*, formed *of*, stick *to*, etc.
- Phrasal verbs *turn into, build up, fall down*
- Preposition *in* with seasons (e.g., *in the summer*), with countries (e.g., *in Canada*), and with the word "diameter" (*in diameter*)
- Articles *a/an* and *the* to signal information status (items newly introduced into the discussion versus items previously introduced)
- Coordinating conjunction *and*
- Subordinating conjunction *although* to introduce adverbial clauses of concession
- Relative clauses beginning with *which, that* and *where* (e.g., "the country where I was born")
- Adjectives - superlative forms with *most*, e.g., "most common"
- Adverbs of frequency - *sometimes, never, often*
- Infinitive following verb *cause* - "to cause X to Y" (see Lesson 3)
- Adjective structures - *too* Adj *to* V (e.g., "too heavy to float") and Adj *enough to* V (e.g., "large enough to fall")

Discourse Features:

- Sequence markers *first, second, third, fourth, last*
- Discourse markers *also, as well*
- Discourse marker *in contrast*
- Textual marker *in conclusion*
- Paragraph unity, paragraph structure (indenting)
- Essay format

Functions:

- Defining
- Classifying
- Explaining and describing
- Expressing cause and effect using marker *so that*
- Comparing and contrasting

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Imagery - using pictures of forms of precipitation to understand the different types
- Note taking - when completing T-lists
- Inferencing - guessing while taking notes
- Resourcing - using visuals as a resource
- Grouping - information about precipitation

- Classifying - identifying and describing different types of precipitation
- Auditory representation - while taking notes
- Summarizing - information from a text on a T-list
- Deduction/induction - when writing sentences and descriptive paragraphs
- Elaboration - expanding another aspect of the water cycle (precipitation)

Social-Affective Strategies:

- Cooperation, Questioning for clarification, Self-talk

Materials:

- Reading passage excerpted and adapted from several sources: (a) Terry Bilyk's *Let's Find Out: Exploring Science in the World Around You* (D.C. Heath Canada Ltd., 1993, pp. 228-231), and (b) information from Environment Canada, Atmospheric Environment Service
- Pictures of the five different types of precipitation. These can be found in almost any reference book on weather, e.g., Bilyk (1993), pp. 228-231.
- Precipitation T-list (see Presentation phase)

Procedures:

Note: This lesson utilizes the **T-list Procedure** explained in Chapter 3 and used previously in Lesson 5 of this unit (the "clouds" lesson). In this lesson we present a series of general steps for the T-list Procedure, elaborating upon these steps in some cases when explaining particular structures, learning strategies, etc.

I. PREPARATION - Listening and Speaking

Introduce the topic of the lesson by linking it to material learned in previous lessons. In this case, review the water cycle using the graphic representation from Lesson 4 to elaborate upon the phenomenon of precipitation. Discuss the different forms of precipitation that the students are familiar with. Show some pictures of different types of precipitation and brainstorm about the following:

- the five types of precipitation — drizzle, rain, sleet, snow, hail
- liquid, freezing, and frozen precipitation
- descriptions of the forms of precipitation
- how different types of precipitation are formed
- approximate temperatures during formation
- effects of precipitation

All of these are either main ideas or details in the T-list they will be completing.

[Advance organization]
[Selective attention]

[Elaboration]
[Imagery]
[Inferencing]
[Grouping]

II. PRESENTATION - Listening and Writing

This stage focuses on the **"Forms of Precipitation" T-list**, which is given below following a copy of the **text** it is based on.

Summarize some of the important new information discussed during the Preparation stage, and write the key words on the chalkboard or on a transparency. Then distribute the "Forms of Precipitation" T-list and discuss how to complete it. The students will likely have little trouble understanding the basic procedure, as they have previously completed a T-list in Lesson 5 ("clouds"). A number of different strategies can be integrated into this discussion; refer to Lesson 5 for details of how this can be done.

The next step, the dictation phase of the T-list Procedure, is conducted by reading the "Forms of Precipitation" **text** aloud to the students (see next page). They listen carefully and try to complete their T-lists, using abbreviations if necessary. Dictate the article a second time, and a third time if necessary, to ensure that the students have had a chance to fill in most of the details. Each dictation should be slightly faster than the one preceding. [Note: One version of the completed T-list can be found at the end of this lesson.]

[Selective attention]
[Self-monitoring]

[Note taking]
[Auditory representation]
[Grouping]
[Inferencing]
[Summarizing]

Forms of Precipitation - Text

Precipitation is any product of the condensation of water vapor which falls from clouds to the ground. There are five main types of precipitation: drizzle, rain, sleet, snow, and hail.

The first type, drizzle, is liquid precipitation. Drizzle appears as fine drops of water less than 0.5 mm in diameter. Drizzle floats to the ground rather slowly and does not make a splash on still water. It is formed when a gentle breeze moves a fog so that the small water droplets in the fog collide and form droplets large enough to drift downward. We notice them as very light rain known as drizzle. Drizzle falls when the temperature is above 0°C. The main effect of drizzle is a dampness on the ground.

The second type, rain, is also liquid precipitation. Rain appears as round droplets approximately 5 mm in diameter. These are called raindrops, and they fall to the ground quickly and make a splash on still water. Rain is formed when water droplets become larger inside a cloud. Sometimes the condensing droplets move up and down inside the cloud several times, bumping into other droplets and joining together before they become large enough to fall. Rain falls when the temperature is above 0°C. The effects of rain are usually beneficial, but too much of it can cause floods.

The third type, sleet, is freezing precipitation. Sleet begins as rain and turns into small wet balls of ice. It is formed when rain falls on very cold ground and freezes on contact. Sleet usually falls when the temperature is exactly 0°C. Sleet can have very dangerous effects, causing extremely icy conditions on streets and roads.

The fourth type, snow, is frozen precipitation. Snow appears in the form of flakes, called snowflakes, which look like stars with six points and many side branches. Snowflakes start out as snow crystals formed at the top of a cloud where it is freezing. Snowflakes are formed when these crystals build up points and branches as they fall down through the lower, moister levels of the cloud. Snow occurs when the temperature is below 0°C. The effects of snow can be winter storms or blizzards, causing "white outs" and blocked roads.

The last type, hail, is frozen precipitation as well. Hail appears as layered balls of ice with a diameter ranging from 5 to 50 mm in diameter or sometimes more. Hail is formed in very tall cumulus clouds with strong up-and-down air currents. These currents cause water droplets to be blown upwards into cooler clouds, where they may freeze and then start to fall. As the frozen droplets fall through the lower, warmer parts of the cloud, liquid droplets may stick to them. If they are moved up and down in a cloud by the air currents a few more times, they grow larger and larger until they become too heavy to float and fall to the ground as hailstones, little round balls of ice. Hail falls when the temperature is above 0°C. Hail can have very serious effects, depending on the size of the hailstones. Hail often causes damage to property and people.

Adapted from *Let's Find Out: Exploring Science in the World Around You* by T. Bilyk.
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Forms of Precipitation - T-List

Main Ideas	Details
Precipitation - any product of ______ of water ______ ______	
______ main types	
1. ______	a. ______ precipitation
	b. Description - fine drops of ______ less than ______. How drizzle falls:
	i) floats ______
	ii) does not ______
	c. Formed - when a breeze ______ so that small droplets ______ and form droplets large enough ______
	d. Approximate temperature - ______
	e. Effects - ______
2. ______	a. ______ prec.
	b. Descr. - ______ approximately ______ called ______ How raindrops fall:
	i) ______
	ii) make ______
	c. Formed - begin as water ______ inside ______. These move ______ several times. ______ each other and ______ before they become ______ enough ______
	d. Approx. temp. ______
	e. Effects: ______
3. ______	a. ______ prec.
	b. Descr. - begins as ______. turns into ______
	c. Formed - when rain ______

and ____________________

d. Temp. __________

e. Effects - __________

icy conditions ____________________

4. __________

a. __________ prec.

b. Descr. - __________ called __________.

look like ____________________

c. Formed - begin as snow __________ formed

__________ where __________

Snowflakes formed when crystals __________

__________ as they fall __________

__________ of the __________

d. Approx. temp. __________

e. Effects: ____________________

____

____

5. __________

a. __________ prec.

b. Descr. - layered ____________________

diameter ranging ____________________

c. Formed - in tall ____________________

with ____________________

Currents cause water droplets to be __________

__________ where they __________ and

__________ through __________, warmer

__________ Then more liquid droplets

__________; these move __________

in cloud and grow __________ until __________

____________________ and

__________ as __________

d. Approx. temp. __________

e. Effects: can be __________ depending on

____________________. Often causes

__________ to ____________________

III. PRACTICE - Speaking and Reading

Assign the students to partners or small groups. They compare their T-lists and pool information. Assign a time limit (e.g., 10 minutes). Allow the students to try spelling the words as best they can, without providing too much assistance; correct spelling will be discussed during the Evaluation stage.

[Self-evaluation] *[Elaboration]* *[Cooperation]* *[Questioning for clarification]*

IV. EVALUATION - Speaking and Reading

After the students have completed their individual T-lists, have them dictate to you the various parts they have filled in, as a class activity. Write the words in the appropriate blanks on the chalkboard or overhead transparency, focusing on the correct spelling of the words. If the students have misspelled some of the words, this is their chance to make corrections as they compare their T-lists with the copy on the board or overhead.

[Self-evaluation] *[Deduction/induction]* *[Cooperation]*

V. FOLLOW-UP - Writing

After the T-lists have been completed, teach the students how to transform the main ideas and details into a series of expository paragraphs. Discuss, demonstrate, and model this writing activity with the class to ensure their success when they are writing their paragraphs. They use their T-lists and consciously supplement the details with the grammatical structures necessary to produce correct sentences and paragraphs. This process is described in detail in the Follow-up stage of Lesson 5 ("Clouds").

This T-list could be transformed into an expository essay with an introduction, a body consisting of five paragraphs (each explaining one of the five types of precipitation), and a conclusion.

First discuss with the students, and model for them, the title and how they would write the introductory paragraph using the information on their T-lists. Elicit from them what information would go into the introductory paragraph by drawing their attention to the "main ideas" column of the T-list, where all the information for the introductory paragraph should come from. Allow some originality in the initial definition, as there is no need to replicate the first sentence in the dictated text. E.g.:

> Precipitation is any product of the condensation of water vapor that falls from the sky. There are five main types of precipitation. They are drizzle, rain, sleet, snow, and hail.

After they write their introductory paragraphs, have them underline the words they took from their T-list, as shown above.

Note that there are other ways of writing a short introductory paragraph of this type. Another useful technique is to use a colon and list the five types.

> Precipitation is any product of the condensation of water vapor that falls from the sky. There are five main types of precipitation: drizzle, rain, sleet, snow, and hail.

This is a good place to point out to the students that this procedure is called **classifying**, and that it is commonly done in expository writing in which a number of comparable objects or phenomena are going to be discussed.

Next discuss and model the body of the expository essay, which will consist of five paragraphs, one for each type of precipitation. All of the information the students will need for each paragraph can be obtained from the "details" column of their T-lists. This step also provides an excellent opportunity to integrate and to reinforce the following structures or discourse features:

a) Paragraph formation - each paragraph deals with a different subtopic, and the first line of each paragraph is indented.

b) Subject-verb agreement - e.g.:

- Drizzle *is* liquid precipitation.
- Sleet *begins* ...
- Droplets *stick* ...
- Snow *has* ...

c) Articles - "a/an" (for singular nouns) and no article (for plural nouns) to indicate items newly introduced into the exposition, and "the" to indicate items which have been previously introduced. E.g.:

> Rain is formed when *[no article]* water droplets become larger inside *a* cloud. Sometimes *the* condensing droplets move up and down inside *the* cloud several times ...

d) Pronouns - e.g.:

- Personal - e.g., drizzle = *it*, raindrops = *they*, droplets = *them*
- Demonstrative - e.g., *These* are called raindrops .... Snowflakes are formed when *these* crystals ...

e) Present tense to indicate scientific truths - e.g., Drizzle *floats* to the ground rather slowly and *does not make* a splash on still water.

f) Passive voice - e.g., Rain *is formed* when ...

g) Coordinating conjuction "and" - e.g., These are called raindrops, *and* they fall to the ground quickly *and* make a splash on still water.

h) Punctuation - commas and periods in appropriate positions.

Here is one example of the first paragraph of the body of the essay. It is based on section 1 of the T-list.

> Drizzle is liquid precipitation formed of fine drops of water less than 0.5 mm in diameter. Drizzle falls to the ground slowly and does not make a splash on still water. It is formed when a breeze moves a fog, causing small droplets to collide and form droplets large enough to drift downward. Drizzle forms in temperatures above 0°C. The effect of drizzle is a dampness on the ground.

Underline the words taken from their T-lists, as shown below, to draw attention to all the information that they do obtain from the "details" column of their T-lists. Discuss the fact that the non-underlined words are grammatical structures of various types which have to be added to the basic details in order to create a well-written paragraph. This demonstration will provide a good model for the remaining four paragraphs in the body of their expository essay.

> Drizzle is liquid precipitation formed of fine drops of water less than 0.5 mm in diameter. Drizzle falls to the ground slowly and does not make a splash on still water. It is formed when a breeze moves a fog, causing small droplets to collide and form droplets large enough to drift downward. Drizzle forms in temperatures above 0°C. The effect of drizzle is a dampness on the ground.

To conclude, discuss the various types of precipitation which frequently occur in their countries of origin, and compare and contrast these with the types of precipitation that are common in Canada. This information, which will differ from student to student depending on the countries they came from, could form part (or all) of the conclusion of their expository essays. E.g.:

> In conclusion, the most common forms of precipitation are different in different countries. In the country where I was born, Vietnam, the usual forms of precipitation are rain and drizzle, although hail sometimes falls as well. Snow and sleet never fall. In contrast, snow and rain are the most common forms of precipitation in Canada, although drizzle and hail sometimes fall in the summer and sleet may fall in the winter.

This sample paragraph contains a number of important structures and discourse features, some occurring earlier in this lesson, that could be discussed with the students. Among these are:

- Superlative form *most common*
- Use of preposition *in* with countries, e.g., "in Canada," "in the country where I was born"
- Use of preposition *in* with seasons - "in the summer," "in the winter"
- Relative clause beginning with *where*
- Noun in apposition, enclosed in commas - *Vietnam*
- Subject-verb agreement, e.g., "drizzle and hail sometimes *fall*"

- Adverbs of frequency, including position in sentences - *sometimes, never*
- Modal verb *may* to express possibility of occurrence
- Subordinating conjunction *although* to introduce adverbial clause of concession
- Discourse markers *in conclusion, as well, in contrast*

Extended Activity:

As in Lesson 5 ("clouds"), the students could be introduced to some interesting idioms associated with precipitation. This is another good opportunity to discuss the difference between literal and figurative language. Some examples of suitable idioms are:

- Raining cats and dogs
- Rained out
- Take a rain check
- Save it for a rainy day.
- It never rains but it pours.
- Snow job
- To feel snowed under

Forms of Precipitation - T-List

Main Ideas	Details
Precipitation - any product of condensation of water vapor which falls from clouds 5 main types	
1. drizzle	a. liquid precipitation b. Description - fine drops of water less than .5mm in diam. How drizzle falls: i) floats to ground slowly ii) does not make splash on still water c. Formed - when a breeze moves a fog so that small droplets collide and form droplets large enough to drift downward d. Approximate temperature - above 0°C e. Effects - dampness on ground
2. rain	a. liquid prec. b. Descr. - round droplets approximately 5mm in diam. called raindrops How raindrops fall: i) quickly ii) make splash on still water c. Formed - begin as water droplets inside cloud. These move up + down several times, bumping into each other and joining together before they become large enough to fall. d. Approx. temp. above 0°C e. Effects: beneficial, but too much causes floods
3. sleet	a. freezing prec. b. Descr. - begins as rain. turns into small wet balls of ice c. Formed - when rain falls on cold ground

and freezes on contact

d. Temp. 0°C

e. Effects - dangerous

icy conditions on streets + roads

4. snow

a. frozen prec.

b. Descr. - flakes called snowflakes

look like stars w. 6 points + many side branches

c. Formed - begin as snow crystals formed at top of cloud where freezing. Snowflakes formed when crystals build up points + branches as they fall through lower, moister levels of the cloud

d. Approx. temp. below 0°C

e. Effects: winter storms + blizzards

"white-outs"

blocked roads

5. hail

a. frozen prec.

b. Descr. - layered balls of ice

diameter ranging from 5-50 mm or more

c. Formed - in tall cumulus clouds

with strong up + down air currents

Currents cause water droplets to be blown upwards where they freeze and start to fall through lower. warmer parts of cloud. Then more liquid droplets stick to them: these move up + down in cloud and grow larger until they become too heavy to float and fall to ground as hailstones

d. Approx. temp. above 0°C

e. Effects: can be serious depending on size of hailstones. Often causes damage to property + people

Lesson 8: Creative Writing - Language Arts

Objectives:

Content Objectives:

- To incorporate and elaborate upon the academic language associated with weather. in a creative writing lesson
- To exercise students' imaginations in writing tall tales about weather conditions

Language Objectives:

Skills:

- Listening - to class discussions: to other students who are creating their own tall tales
- Speaking - to class discussions: to each other. as they cooperate in creating tall tales
- Reading - notes. T-lists. and summaries for information and vocabulary: tall tales produced by themselves and others
- Writing - a tall tale about some weather condition

Linguistic Knowledge:

Vocabulary Development:

stretch. exaggerate. tall tale. outline. narrative. homonym. introduction. body. climax. conclusion. event. journey. positive. plot. setting. problem. solution. still (adv). uprooted. shingles. frisbee. avoid. crawl. on hands and knees. unbuttoned. kite. let go. fire hydrant. spout up. curb. school grounds. sudden. huge. gust. wonder (v). realize. fortunately. lucky for me. idiom

Structures:

- Special sentence forms:
  It was so ________ that ____________________
  It ________ed so much that ________________
  The ________s were so big that ____________
- Past tense - regular (e.g.. *crawl-crawled*) and irregular (e.g.. *fly-flew. hold-held*)
- Past continuous (progressive) tense. e.g.. "shingles *were flying*"
- Past perfect tense. e.g.. "I realized what *had happened*"
- Past perfect continuous tense. e.g.. "I *had been walking*"
- Passive voice. e.g.. "trees *were uprooted*"
- Use of *had to* to express past obligation or necessity. e.g.. "I *had to* let go"
- Participial phrases. e.g.. "like frisbees *flying at 100 km/hr.*"
- Expressing repeated actions using *keep* + V-ing. e.g.. "he *kept kicking* the ball"
- Infinitive of purpose. e.g.. "I dived to the ground *to avoid* them"

- Prepositional phrases
- Prepositions used with certain verbs - fly *off*, hold *onto*, start *to*, blow *off*, arrive *at*, try *to*, etc.
- Phrasal verbs - *blow away* (separable), *spout up*, *blow up*
- Sentence combining using coordinating conjunctions (and, but, so) and subordinate clauses
- Subject-verb agreement
- Pronouns
- Plural forms
- Punctuation marks used for direct quotations

Discourse Features:

- Paragraph formation
- Narrative markers of sequence, attitude, etc. - e.g., finally, suddenly, fortunately

Functions:

- Defining - of the term "tall tale"
- Narrating - writing a tall tale (exaggerated story)

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Organizational planning, Selective attention, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Imagery - visually imagining imaginative events in their narratives
- Resourcing - using their notes, T-lists, and summaries to gather information
- Elaboration - using their prior knowledge about weather as the basis for exaggerating events into a tall tale
- Transfer - of factual knowledge about weather to creative form of a tall tale
- Deduction/induction - using appropriate grammatical and textual forms in writing their tall tales
- Summarizing - when developing the story outline
- Note taking - when writing their outlines during the stage of plot development

Social-Affective Strategies:

- Cooperation, Questioning for clarification, Self-talk

Materials:

- T-lists, cycle diagrams, summaries, etc., from previous lessons
- A blank story outline form (see Practice phase)
- An example of a tall tale, e.g., a Paul Bunyan story

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Procedures:

I. PREPARATION - Listening and speaking

Conduct a class discussion about severe weather conditions and their effects. Have students refer to their T-lists, cycle diagrams, and notes relating to adverse weather systems or conditions. E.g.:

Snow - "white outs," blocked roads, getting "snowed in," blizzards

Rain - floods (e.g., in basements, on streets), monsoons, stalled cars, storms

Hail - large hailstones, sometimes as big as golf balls, causing damage to property and people

Wind - tornadoes, hurricanes, property blowing away

Fog - people can't see, accidents, dampness

Heat - sweat, discomfort, sunburns

Cold - freezing, stalled cars, frostbite

Sleet - causing icy conditions, slippery roads, accidents, people fall, cars can't get up bridges or hills

[Advance organization]
[Selective attention]
[Elaboration]
[Resourcing]

II. PRESENTATION - Listening and speaking

Discuss the nature of a "tall tale," i.e., a story containing a great deal of exaggeration, with the class. Begin by writing the word "tale" on the board and asking:

- What is a tale? (Answers will vary)
- Is there another word you know that sounds like the word "tale" but is spelled differently and means something different? (yes)
- What is it? ("tail") What does this word mean? (animal's tail)

- What do we call words that sound the same but are spelled differently and mean different things? (homonyms)
- Can you think of any other homonyms? [Take some examples from the class and discuss meanings, e.g., *pair/pear, two/to/too, there/their, fair/fare, wait/weight*]

- Let's go back to the word "tale"? What is a tale? (a story)
- What kind of story is a tale? Is it usually read or told? (sometimes told, but can be read)
- Can you think of any tales that you have read?
- Can you think of any tales that you have been told about? (e.g., Canterbury Tales, Tale of Two Cities, Tales of Paul Bunyan, tale of Peter Rabbit, fishing tales)

Read an excerpt from a Paul Bunyan story (or any other tall tale) and discuss it.

- This is called a "tall tale." What do you think that means? (a story that isn't true)
- But lots of stories aren't true. What makes tall tales special? (They contain things that could never happen.)
- Do you think there are some true things in tall tales like this? (yes)
- What do you think is true in this Paul Bunyan story? (There was a man named Paul Bunyan. He was big and strong.)
- Do you think he was as big as the story describes him? (no)
- Do you think he had the strength to do the things he did? (no)
- Was the truth "stretched" in this story about Paul Bunyan? (yes)
- What does "stretching the truth" mean? (starting with something that might be true, but ending with something that couldn't be true)
- What do we call terms like "stretching the truth" or "raining cats and dogs"? (idioms)
- Do you remember what idioms are? [Discuss idioms and give some examples by referring to the extended activities of Lesson 5 ("clouds") and Lesson 7 ("precipitation").]

- Can you think of other examples of stories which have "stretched the truth"? (e.g., fishing stories, sports skills, etc.)
- What is another word for "stretching the truth"? ("exaggerate")
- When we say "It's raining cats and dogs," what is true and what is exaggerated? (true — raining very hard; exaggerated — cats and dogs)
- Would you say a tall tale is exaggerated? (yes)
- Would you say Paul Bunyan is an exaggerated tall tale? (yes)
- How could we define or describe a tall tale? (e.g., "A tall tale is a story or narrative about some event or person which is exaggerated so much that it obviously could not be true.") [Note: Other definitions are possible; have the students work one out together.]
- What is another word for story? (narrative)
- Do you all understand what the word "exaggerate" means, and what a tall tale is? (yes)

- Good. Today we are going to write a tall tale about a weather condition. Can you think of any weather conditions we could exaggerate? (Answers will vary.) [Note: Refer to the information listed on the chalkboard or transparency during the Preparation phase, to facilitate this discussion.]
- How could we exaggerate some of these weather conditions? E.g.:

  "The hailstones were so big that they flattened the house."
  "It rained so much that my dog was swimming in the basement."
  "It was so hot that I fried an egg on the sidewalk."

- We will begin our tall tales with one of the following structures:

  The ____________ were so big that ____________________________
  It ____________ed so much that ____________________________
  It was so ________________ that ____________________________

[Note: Refer back to the examples above to illustrate how these structures are used and what they mean.]

Now choose one of the structures and demonstrate how to write a tall tale by creating a narrative in the form of an outline.

Strategy Instruction:

[Organizational planning]--

- Let's use the structure "It was so ______________ that ______________________."
  Let's talk about wind. What would your first sentence be? ("It was so windy that ...")
- What could we use to help us plan our tall tale? (an outline)
- How would we write this outline? What will it be about? (exaggerated events or things that happen because of the weather)
- How could we make our tall tale a narrative, that is, a story? (e.g., write about a journey from one place to another place during this weather condition, and the problems encountered along the way)
- What do we have to remember to do if this is to be a real tall tale? (exaggerate a sequence of events that could happen along the way)

Discuss and model, with the class, how to create an outline consisting of an introduction, body, climax, and conclusion for the narrative. Construct the plot in the form of an outline, with the class contributing ideas. Discuss the definitions of the words "plot" and "outline," e.g., a **plot** is what happens to the characters of a story; an **outline** is a plan of the plot of a story.

- What do we have to write first? (the introduction)
- What information does the introduction give? (the setting)
- What is a **setting**? (the place where the story happens, or the situation)
- What will be the setting of our story? (an exaggerated weather condition — the wind)
- That is the situation. What about the place — where should the story begin? (at home) Yes; let's say it begins "in front of my house."
- Should the setting include something besides the place and situation? (yes, the time)
- Let's choose a day in the past. How about "last Friday"? (OK)
- What was the first sentence we chose? ("It was so windy that ...")
- What should we write to exaggerate the strength of the wind and the problem we could encounter? (e.g., "It was so windy that I had been walking for ten minutes and I was still in front of my house.")
- When did this story happen? What did we decide? (last Friday)
- Let's start with that. Our sentence becomes:

  Last Friday it was so windy that I had been walking for ten minutes and I was still in front of my house.

- What is this the first sentence of? (the introduction)
- What else should we write in the introduction to introduce the setting and to demonstrate the problem the wind caused? (exaggerated things that could happen)
- What are some of the exaggerated things that could cause a problem on a windy day, and what is the solution to the problem? (E.g.:

    - trees uprooted — flew by — causing forest behind me
    - shingles flying off roofs — like speeding frisbees, 100 km/hr.
    - dived to ground to avoid them
    - crawled on hands and knees)

- Is that enough to introduce the setting? (yes)
- What should the **body** of our narrative consist of, to make it a story? (body could be a journey to some place and a sequence of exaggerated events that happened along the way and caused problems)
- Good. So where will our journey be to? (crawling to school)
- What are some exaggerated events that could happen on the way to school? (E.g.:
    - neighbor flew by — coat unbuttoned — like a kite
    - held on to fire hydrant — it moved — let go — water spouted out
    - crawled along curb to corner — "Don't walk" sign blew off of post — nearly hit me
    - arrived at school grounds — saw soccer goalie practising — kicked ball into wind — tried to stop it from scoring as it blew back)

- What comes next? (the climax)
- What is a **climax**? (the major turning point in a plot)
- What could be the climax or major turning point in our plot? (E.g.:
    - crawled to front steps of school
    - sudden huge gust — school bag blew away — books and completed assignments gone — teacher will blow up — stronger than wind
    - tried to open door — locked — wondered why — suddenly realized
    - wind so strong that it had blown Friday away — now Saturday!)

- What will be the last part of our story? (conclusion)
- What is a **conclusion**? (the ending)
- Let's make it a positive or happy ending. What could we write? (E.g.:
    - easy journey home — wind pushed me all the way
    - two days to do assignments again)

III. PRACTICE - Writing

Distribute a copy of the following blank outline to each student, to help him or her construct an outline of a tall tale. Allow the students to work in pairs to develop their outlines, and encourage them to ask for help from the teacher if they need it.

[Self-monitoring]

[Note taking]
[Summarizing]
[Elaboration]
[Transfer]
[Imagery]

[Cooperation]
[Questioning for clarification]

See next page for a copy of the blank story outline.

STORY OUTLINE

A ____________________ Day

I. Introduction

A. Choose one of:

It was so ______________ that _____________________
It _______________ed so much that __________________
The ______________s were so big that ________________

Then list some exaggerated things that could happen:

B. ____

C. ____

D. ____

E. ____

II. Body — Journey to (some place) ________________

Exaggerated events that happened along the way:

A. ____

B. ____

C. ____

D. ____

III. Climax

A. ____

B. ____

C. ____

D. ____

IV. Conclusion — positive, happy ending:

A. ____

B. ____

Example: A Windy Day

I. Introduction

- A. It was so windy that I had been walking to school for ten minutes and I was still in front of my house.
- B. trees uprooted — flew by — causing forest behind me
- C. shingles flying off roofs — like speeding frisbees, 100 km/hr.
- D. dived to ground to avoid them
- E. crawled on hands and knees

II. Body — journey, crawling to school

Exaggerated events that happened along the way:

- A. neighbor flew by — coat unbuttoned — like a kite
- B. held on to fire hydrant — it moved — let go — hydrant blew away — water spouted out — blew northeast
- C. crawled along curb to corner — "Don't walk" sign blew off of post — nearly hit me
- D. arrived at school grounds — saw soccer goalie practising — kicked ball into wind and then tried to stop it from scoring as it blew back

III. Climax

- A. crawled to front steps of school
- B. sudden huge gust — school bag blew away — books and completed assignments gone — teacher will blow up — stronger than wind
- C. tried to open door — locked — wondered why
- D. suddenly realized — wind so strong that it had blown Friday away — now Saturday!

IV. Conclusion — positive, happy ending

- A. easy journey home — wind pushed me all the way
- B. two days to do assignments again

IV. EVALUATION - Reading and writing

When the outlines have been completed, teach the students how to utilize them to write their own tall tales. Discuss and review the rules of paragraph formation by referring to the Roman numerals on the outlines — the information under each Roman numeral should comprise a separate paragraph.

Distribute copies of the completed tall tale derived from the student-produced outline above. [Note: See the end of this lesson for a copy of this story. Since you will need several class periods to complete this lesson plan, you will have time to write the story from the outline and photocopy it.] Compare the completed narrative to the outline, in order to illustrate how the sentences and paragraphs follow the same sequence as in the outline. A discussion of important structures could be integrated into the lesson at this point. E.g.:

a) Past tense formation

Regular (e.g., *crawl-crawled*) and irregular (e.g., *fly-flew*)

b) Past continuous tense

E.g., Shingles *were flying* off roofs

c) Past Perfect tense

E.g., The wind was so strong that it *had blown* Friday away

c) Past perfect continuous tense

E.g., I *had been walking* to school for ten minutes ...

d) Pronouns

E.g., *it, I, me, he*; possessive forms *my, his, its*

e) Sentence combining

- using coordinating conjunctions - *and, but, so*
- making subordinate clauses; e.g.:
  - Adverbial - *as it blew back, when I got there*
  - Adjectival - *where I saw a soccer goalie practising*
  - Nominal - I realized *what had happened*

f) Participial phrases used as adjectival modifiers

E.g., *looking like a kite, blowing towards the northeast*

g) Prepositional phrases

E.g., *against me, in front of my house*

These are just a few examples of structures that can be taught through this passage. Others can be found in the list of structure objectives at the beginning of this lesson. You will not want to teach all of these on an explicit level, of course, but you may find a few of them worth focusing on.

[Deduction/induction]

The students then write their own tall tales, based on the outlines completed during the Practice phase. They can refer to the model tall story "The Windy Day" (see below) to help them develop their own sentences and paragraphs.

After they have finished their stories, they edit them with the teacher and write their final drafts.

[Self-evaluation] *[Deduction/induction]* *[Cooperation]* *[Questioning for clarification]*

V. FOLLOW-UP - Reading

The students could illustrate their tall tales, if desired. Following this, they read their final drafts to the class.

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MODEL TALL TALE

A Windy Day

Last Friday it was so windy that I had been walking to school for ten minutes and I was still in front of my house. Trees were uprooted and flew by, causing a forest behind me. Shingles were flying off roofs and speeding past me like frisbees flying at 100 km/hr. I dived to the ground to avoid them, and crawled towards school on my hands and knees.

Suddenly a neighbor flew by with his coat unbuttoned, looking like a kite. I held onto a fire hydrant, but it started to move so I had to let go. It blew away and water spouted up into the air, blowing towards the northeast. I crawled along the curb to the corner, where a "Don't Walk" sign blew off its post and nearly hit me. Finally I arrived at the school grounds, where I saw a soccer goalie practising. He kept kicking the ball into the wind and then tried to stop it from scoring as it blew back.

I crawled slowly to the front steps of the school. When I got there, a sudden huge gust of wind blew my school bag away. All my books and completed assigments were gone. "My teacher will blow up, stronger than the wind," I thought. I tried to open the door, but it was locked. I wondered why. Suddenly I realized what had happened. The wind was so strong that it had blown Friday away, and now it was Saturday!

Fortunately, the journey home was a lot easier. The wind pushed me all the way! When I got there, I started to do my assignments again. Lucky for me, I still had two days to finish them.

****

Lesson 9: The Wind Cycle - Science, Language Arts (Text Questioning Technique)

Objectives:

Content Objectives:

- To elaborate upon the students' prior knowledge about wind
- To understand how the wind moves through a cycle
- To draw a cycle diagram and use it as the basis for a descriptive report

Language Objectives:

Skills:

- Listening - to note take; in group discussions
- Speaking - to compare and correct answers in group discussions
- Reading - for specific information to verify answers
- Writing - complete declarative sentences based on questions; a descriptive report

Linguistic Knowledge:

Vocabulary Development:

air, invisible, observe, cool, warm, areas, heavier, lighter, volume, heats, sun, earth, ground, rise, atmosphere, upper, sink, take the place of, replace, movement, underneath, repeat, cycle, main idea, subheading, details, indent, paragraph, become, introduce, introduction, introductory, conclude, conclusion

Structures:

- Subject-verb agreement
- Present tense to express scientific truths
- Present perfect tense to express actions recently completed but with significance for the present, e.g., "Meanwhile, air in the upper atmosphere *has become* cooler and heavier ..."
- Irregular past tense: *sink-sank*
- Passive voice
- Declarative sentence form
- Adverbial clauses of reason (*because* ...)
- Restrictive relative clauses beginning with *that*
- Nonrestrictive relative clauses beginning with *that*; separation by commas
- Sentence combining: compound, complex, and compound-complex sentences
- Coordinating conjunction *and*
- Pronoun *it*; possessive form *its*
- Comparative forms *heavier (than), lighter (than), cooler (than)*
- Use of *the* and *of* with gerunds: e.g., *the warming of*
- Preposition *like* to express comparison

Discourse Features:

- Theme-rheme structures
- Discourse markers of cause and effect: *as a result, causing ... to, so, consequently*
- Simultaneity expressed by markers *as* and *meanwhile*, and through the use of present participles
- Sequence marker *as follows*
- Restating marker *in other words*
- Paragraph unity
- Structure of a descriptive report

Functions:

- Reporting
- Describing
- Expressing cause and effect
- Comparing and contrasting
- Defining

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Predicting - guessing what will happen to the wind
- Inferencing - in class discussions; while note taking; when completing the cycle diagram
- Note taking - for answers to questions; when making the cycle diagram
- Deduction/induction - when writing the descriptive report
- Imagery - using the visual of the wind cycle to understand the movement of the wind; using a cycle diagram to represent a picture
- Resourcing - using a picture of the wind cycle taken from a reference book
- Auditory representation - when taking notes
- Elaboration - of information from questions to a cycle diagram to a descriptive report
- Grouping - classifying information into the proper circle of the cycle diagram

Social-Affective Strategies:

- Cooperation, Questioning for clarification, Self-talk

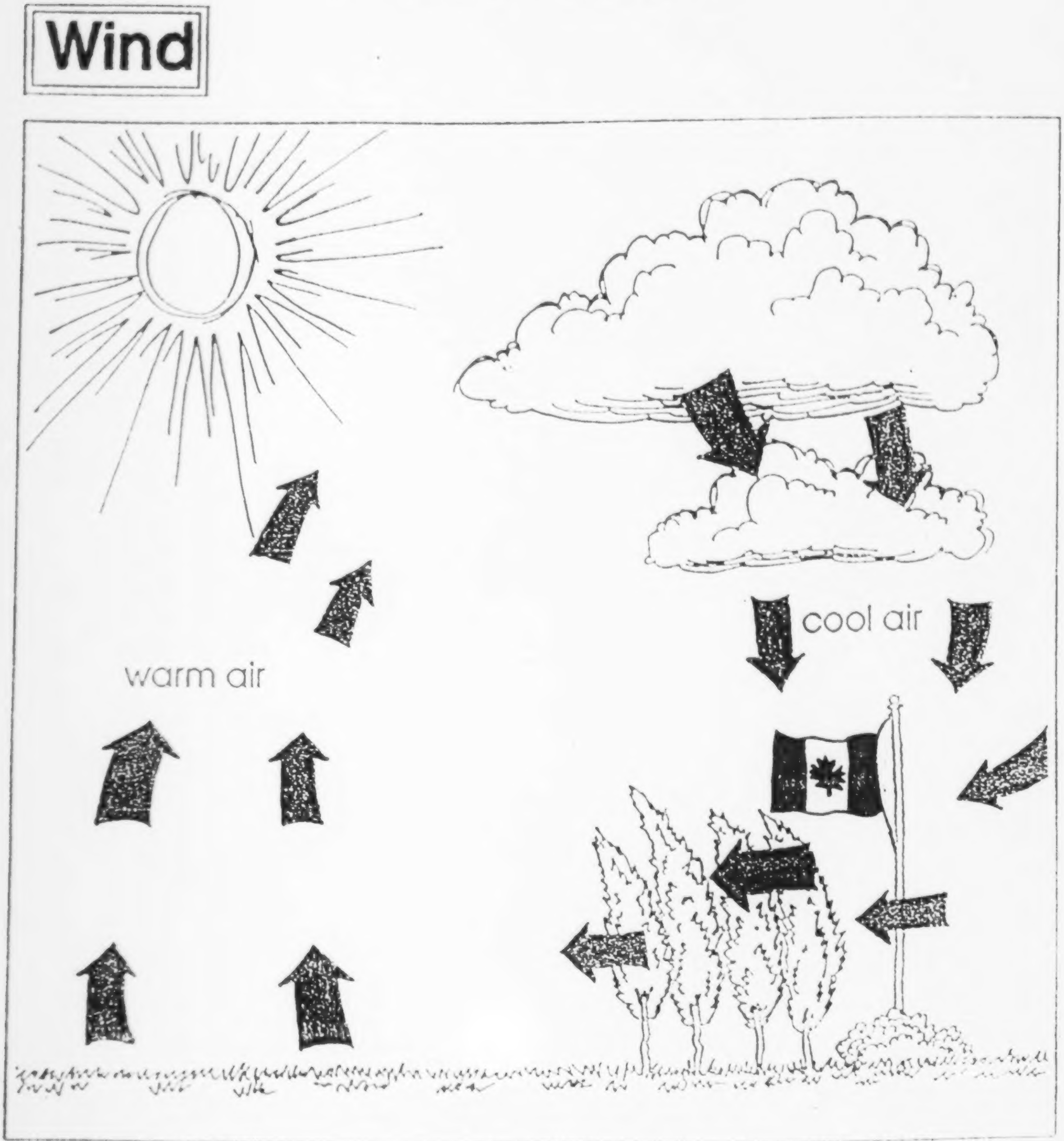
Materials:

- Any reference book with good visuals and a passage describing the causes of wind. An excellent resource for this lesson is Santillana *Bridge to Communication, Middle*

Level C, Student Language Book, Focus Sheet 9.4. The Visual used in this lesson is taken from this source, and the text is an adaptation of the accompanying reading passage.

- Blank cycle diagram (see Follow-up phase).

THE WIND CYCLE - VISUAL



Reprinted by permission of the Publisher. Copyright © 1992 by Santillana Publishing Co., Compton, CA, and San Diego Unified School District. All rights reserved. *Bridge to Communication, Middle Level C, Student Language Book*, Focus Sheet 9.4.

THE WIND

Air is difficult to observe because it is invisible. Wind is moving air. Air always moves from cool areas to warm areas because cool air is heavier than the same volume of warm air. In other words, warm air is lighter than the same volume of cool air.

Wind is caused by the warming and cooling of air, as follows. The process begins when the sun heats the earth and the air near the ground, causing it to become lighter. As a result, it rises into the atmosphere. Meanwhile, air in the upper atmosphere has become cooler and heavier than the air that is rising, so it falls back to the earth. There it sinks underneath the warm air, taking its place. This movement of air is called **wind**.

Meanwhile, as the warm air rises it becomes cooler and heavier, like the air that sank and took its place. Consequently, it sinks back to the earth again, taking the place of other air that is now rising because it has become warmer and lighter. This process, which is repeated over and over again, is called the **wind cycle**.

Procedures:

I, II, III, IV. PREPARATION, PRESENTATION, PRACTICE, EVALUATION

This lesson employs the **Text Questioning Technique (TQT)** described in Chapter 3 and utilized in Lessons 1 and 3 of this unit. Because the procedure has been illustrated in exhaustive detail in those two earlier lessons, there is no need to explain the individual steps again here. Teachers can use the above visual and text, combined with the question list below, to carry out the first four stages of the TQT procedure.

Remember that the written text:

- remains **face up** throughout the preparation phase, as the students are brainstorming;
- remains **face down** throughout the presentation phase, as they are note taking;
- remains **face up** during the practice phase, as they are checking their answers;
- remains **face down** during the evaluation phase, when they are reading their answers to the teacher

The written text contains a few discourse markers that should be discussed prior to the note taking activity: **in other words, as follows, meanwhile**, and **consequently**. Since these are not likely to come out of the discussion of the visual in the Preparation stage, take special care to write these on the board and discuss their meanings with the students.

When the first four phases have been completed, collect the texts (to prevent copying) and tell the students that they are going to write their own descriptive reports explaining the wind cycle.

QUESTIONS FOR PRESENTATION PHASE (NOTE TAKING)

Note: The answers, not given to the students, are in parentheses.

1. Why is air difficult to observe? *invisible*

2. What is wind? *moving air*

3. A. Where does air always move? *from cool areas to warm areas*
   B. Why? *cool air heavier*

4. A. What two things does the sun heat? *earth and air near ground*
   B. What happens to the air? *becomes lighter*
   C. What does it do? *rises into atmosphere*

5. A. What happens to the air in the upper atmosphere? *becomes cooler and heavier*
   B. What does it do as a result? *falls back to earth*

6. A. When it reaches the earth, what does the cool air sink underneath? *warm air*
   B. What does it do to the warm air? *takes its place*

7. What is this movement of air called? *wind*

8. A. What happens to the warm air as it rises? *becomes cooler and heavier*
   B. Then what happens to it? *falls*

9. A. What happens to the cool air that fell? *becomes warmer and lighter*
   B. Then what happens to it? *rises*

10. A. What is this process called? *wind cycle*
    B. Why? *repeated over and over*

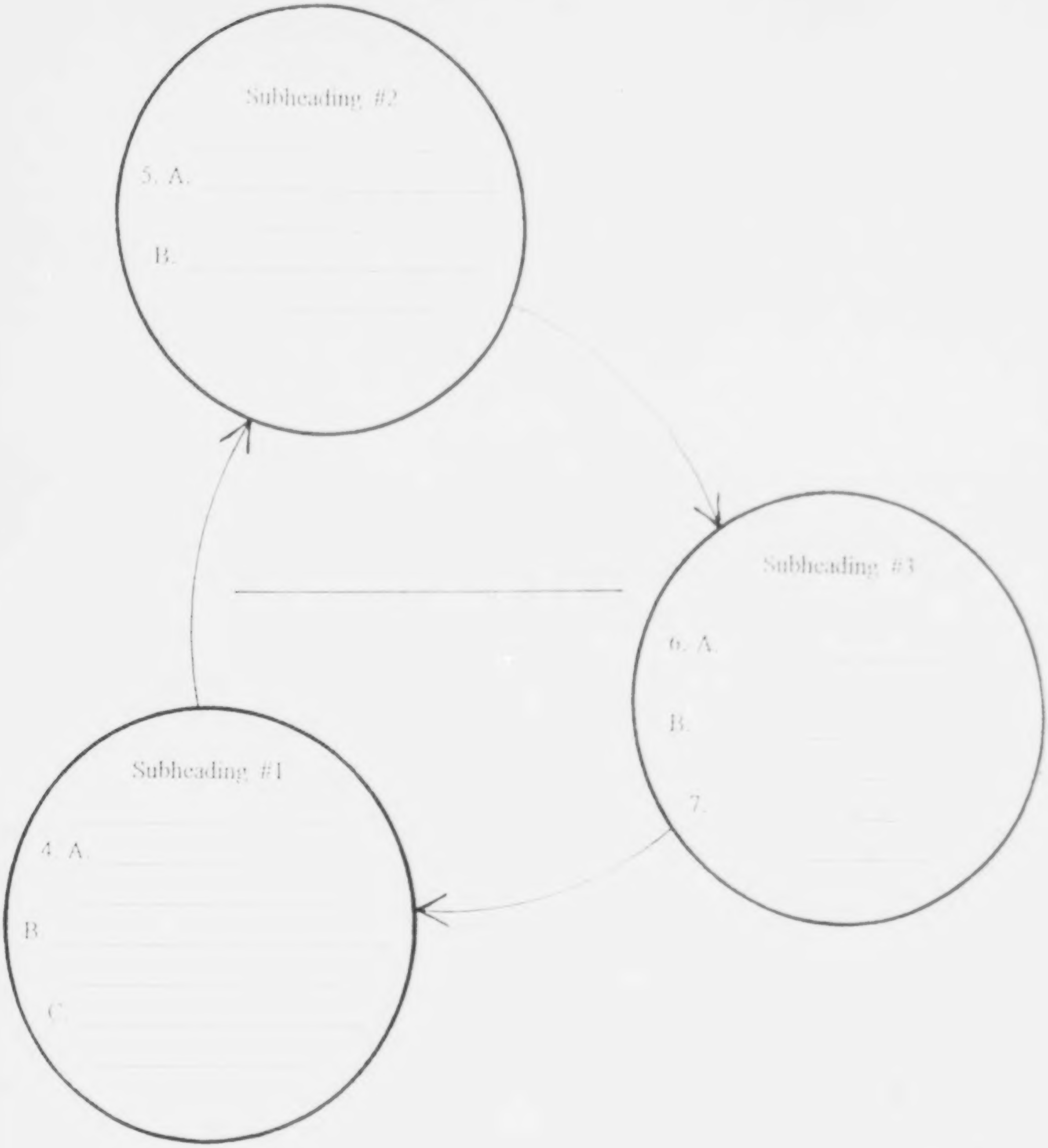
V. FOLLOW-UP - Writing

Give the students a blank cycle diagram that they can use to construct their own wind cycle graphic (see next page).

As mentioned above, tell the students that they are going to write a description of the wind cycle. This will be a descriptive report.

Ask:

- How will you write your report? What could you use to help you plan a report on the wind cycle? (a cycle diagram)


Subheading #2
5. A.
B.
Subheading #3
6. A.
B.
7.
Subheading #1
4. A.
B.
C.

- Do you remember how to draw a cycle diagram? Which cycle did we draw before? (the water cycle) Did you use this to write your descriptive reports? (yes)
- Let's fill in this cycle diagram together. You can fill in yours as I do mine on the overhead.
- First, we need to put something in the middle. What is that called? (the title) What is the title of this diagram? (The Wind Cycle) Good. Fill that in on your diagrams. What must you remember to do when writing it? (use capitals for the first letter of each word)
- Now let's fill in circle #1. Each of the three circles tell something about what happens to the air. What happens to the air first? (various answers — gets warmer, gets heated by the sun, rises, etc.) For Subheading #1, let's write: **Warm Air Rises**.
- Now, where can we find some details about this? (from our question list) Good. Look at your question lists. Which question should we look at? (number 4) How do you know? (It's on the diagram.) What are the answers to A, B, and C in number 4? Remember, you shouldn't write down every word here. Just write the important word, as you do when you take notes.

  A. sun heats earth and air near ground
  B. air becomes lighter
  C. rises into atmosphere

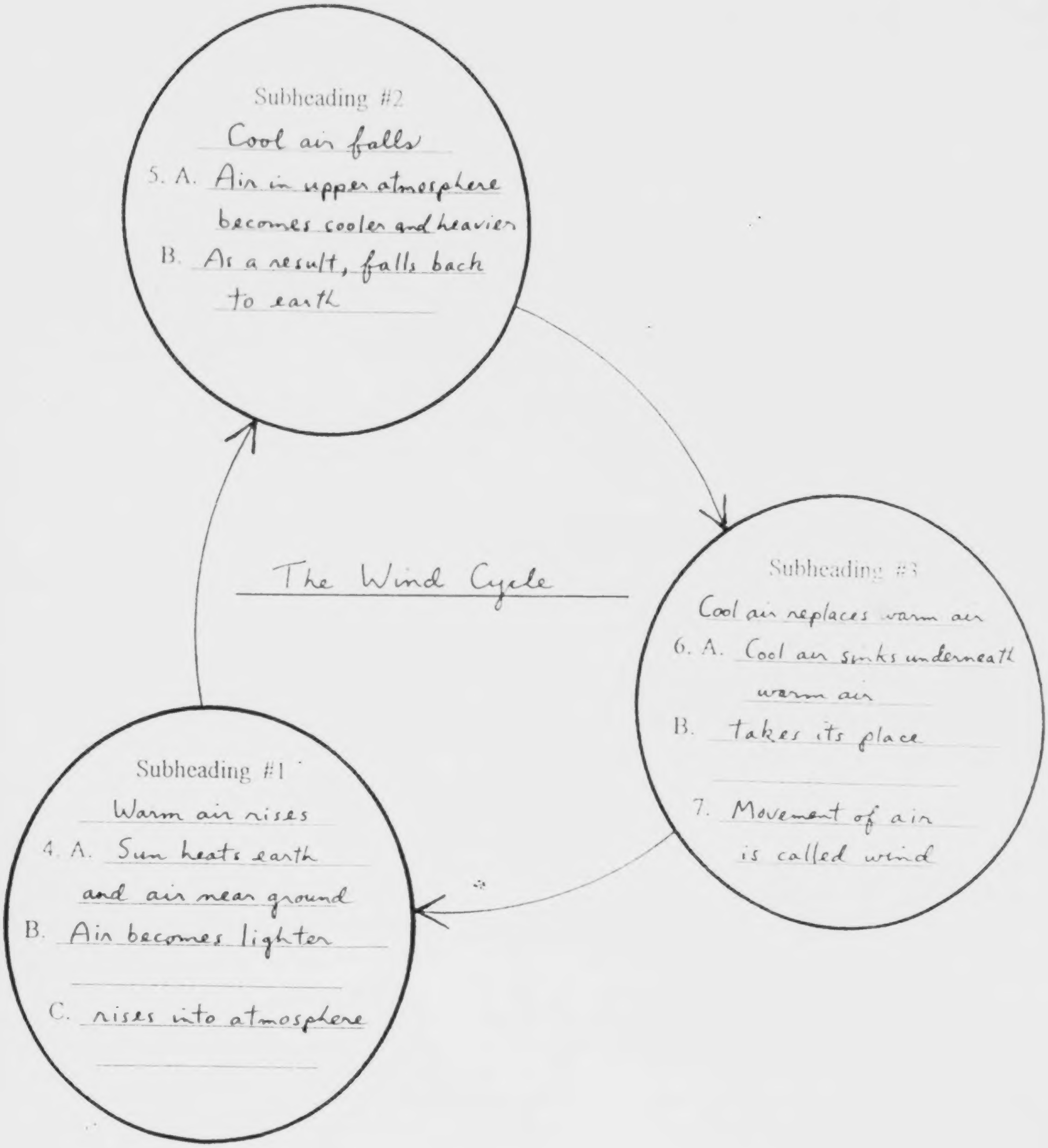
- Good. Write these on your diagrams, as I have done on the overhead.

- Now let's fill in the other two circles. We need subheadings for both. What is the opposite of "warm air rises"? (cool air falls) Good. Use that as subheading #2: **Cool Air Falls**.
- What does the cool air do after it falls back to earth? (takes the place of the warm air) Yes. Let's use the word "replaces" instead — it means the same thing as "takes the place of." Our third subheading should be: **Cool Air Replaces Warm Air**.
- Now fill in the details yourself. Use the answers to the questions numbered in the circles. Remember to use note form.

The students should have little trouble filling in the details of circles #2 and #3. After they have done this, take up the answers with them and complete the overhead transparency of the wind cycle diagram. The final diagram should resemble the figure on the next page.

[Organizational planning]
[Selective attention]
[Self-monitoring]

[Note taking]
[Grouping]
[Transfer]
[Imagery]
[Deduction/induction]
[Inferencing]



Strategy Instruction:

[Deduction/induction]--

The next stage of this lesson is the writing of the descriptive report. Each student will write his or her own report, using the above diagram as a partial guide. Actually, this diagram pertains only to the second, third, and fourth paragraphs of the final report, which will contain five paragraphs in all:

- Paragraph 1: Introductory sentence
- Paragraphs 2, 3, 4: Body of report
- Paragraph 5: Conclusion

The students will be told what to write for the introductory sentence, and then they will write the next three paragraphs themselves, using the diagram as a guide. Finally, they will be told how to construct the concluding paragraph, as shown below. The teaching process is as follows.

Tell the students that they can use this diagram to guide them in writing their descriptive reports on the wind cycle.

- What will your title be? (The Wind Cycle) Where will you put it? (top of the page, in the centre)
- What will you do then? (leave a line)
- How many paragraphs will your report contain? (three) Are you sure? Don't you need a sentence to **introduce** the topic? (yes) What can we call this? It comes from the word "introduce"? **(introduction)** Good. Another word that comes from "introduce" is "introductory" — the first paragraph will be an **introductory paragraph**.
- We are also going to include a **concluding** paragraph. What can we call that? It comes from the word "**conclude**"? **(conclusion)**
- If you include an introductory sentence, three paragraphs based on the diagram, and a conclusion, how many paragraphs will you have altogether? (five)

- Good. We'll start with the introduction. Let's make one up together. How many steps are there in the wind cycle? (three) So let's say that:

  There are three steps in the wind cycle.

- We could use this sentence as it is, but here is a good way to improve it. Where are you going to put the details? (after it) Yes. Another word for this is "following." The details will follow, won't they? (yes) So let's use these words at the end of the sentence: **as follows**. Our introductory sentence becomes:

  There are three steps in the wind cycle, as follows.

- What punctuation mark do we use with "as follows"? (comma) Yes. You usually put a comma just before it.
- What must you do when you write this sentence in your reports? (indent it)
- Good. And what word will you use to begin your next paragraph? (first) Yes, because you're going to start by describing the first step of the wind cycle. What word will you use to start the next paragraph? (second) And the next? (third)

- Good. Can you go ahead and write the next three paragraphs by yourselves now, using the diagram to guide you? (yes)
- Remember to put in all the missing "little words" when you write these paragraphs. For example, you wouldn't write "sun heats earth," would you? (no) What would you write? ("the sun heats the earth")

The students work individually, writing the introductory sentence (paragraph) into their reports and then using their cycle diagrams to guide them in writing the next three paragraphs. When they have finished these, they edit them with their partners and correct any mistakes they can detect.

[Organizational planning]
[Self-monitoring]

[Imagery]
[Elaboration]
[Deduction/induction]

[Cooperation]
[Questioning for clarification]
[Self-talk]

SAMPLE OF TEXT TO THIS POINT

The Wind Cycle

There are three steps in the wind cycle, as follows.

First, the sun heats the earth and the air near the ground. The air becomes lighter and rises into the atmosphere.

Second, the air in the upper atmosphere becomes cooler and heavier. As a result, it falls back to earth.

Third, the cool air sinks underneath the warm air and takes its place. This movement of air is called wind.

Note that variations are possible, as the students can combine sentences in different ways and use different discourse markers (e.g., *so* or *consequently* instead of *as a result*)

The final step is to write the concluding paragraph. One structural (grammatical) objective that can be accomplished at this point is to have the students write nonrestrictive relative clauses beginning with "that" (see below). Explicit grammatical instruction is not necessary here.

- Now that you have finished these three paragraphs, let's look at what you have so far. In one word, what have you described? (wind) Yes, you have explained what causes wind.
- Look at the diagram again. What is the title? (the wind cycle) Why? (because it happens over and over) What tells us this, in the diagram? (the arrows)
- Look at your reports. Are there arrows in your reports? (no) Do you say that this process happens over and over? (no) So you haven't explained that this is a cycle, have you? (no)
- Well, you have to do that, if your report is to be complete. Let's look at the diagram again, and think about why this is a cycle.

- What rose into the atmosphere? (warm air) What happens to it when it reaches the upper atmosphere? (It cools.)
- What fell to the earth? (cool air) What happens to it when it reaches the earth? (It gets warm; or, it warms.)
- Yes. So the process repeats over and over. Your last paragraph should explain this, shouldn't it? (yes)

- What should you explain first in this paragraph? (what happens to the warm air)
- Good. Here's how I want you to write this sentence. Start with "the warm air." Then use the word "that" followed by something to described the warm air. Then tell what happens to it. It looks like this:

  The warm air that ______________________________ ______________

- If you do it this way, you can include two ideas in one sentence. What should we put in the first blank? What happened to the warm air first? (It rises into the upper atmosphere) I asked, "What happened to the warm air first — I want to know what happened to it in the past. What is the past tense of "rise"? (rose) Good. So what happened to it? (It rose into the upper atmosphere) Good. We write:

  The warm air that rose into the upper atmosphere ______________

- Now it is in the upper atmosphere — what happens to it? Use the present tense. (It cools.) Can you use the word "become"? (It becomes cooler.) So we could write:

  The warm air that rose into the upper atmosphere becomes cooler.

- What will you describe next? (what happens to the cool air) What did happen? (It fell to the earth.) And then? (It warms.) Use "become." (It becomes warmer.)
- Good. Can you write your own second sentence, using the word "that"? (yes)
- I won't write it down for you — I want you to write it yourselves.

- What happens next? (It repeats.) What does? Use the word "process." (The process repeats.) Over and over? (yes) What is this called? (the wind cycle) Can you finish the last paragraph yourself, then? (yes)

The students write the last paragraph, beginning with the sentence above (*The warm air that rose into the upper atmosphere becomes cooler*) and writing the rest themselves, as instructed. Then they edit their work with their partners. They can edit them a final time when they read their reports to the teacher.

[Organizational planning]
[Self-evaluation]

[Deduction/induction]

[Cooperation]
[Questioning for clarification]
[Self-talk]

SAMPLE OF FINAL PARAGRAPH

The warm air that rose into the upper atmosphere becomes cooler. The cool air that fell to the earth becomes warmer. The process repeats over and over again. This is called the wind cycle.

Lesson 10: Barometer Experiment - Science (Dictated Instructions Technique)

Objectives:

Content Objectives:

- To learn more about the concept of air pressure.
- To construct a barometer and use it to detect changes in atmospheric air pressure for a period of 2-3 weeks.
- To understand how changes in air pressure can signal changes in the weather.

Language Objectives:

Skills:

- Listening - during discussions; for oral instructions during the dictation phase of the DIT
- Speaking - to exchange information and assistance when the students are checking their instructions and performing the experiment
- Reading - their notes, when discussing the experiment method and performing the experiment
- Writing - taking notes; completing a science experiment report

Linguistic Knowledge:

Vocabulary Development:

flask, beaker, food colouring, felt marker, air pressure, barometer, upside down, rim, in place, constant, clause, imperative, passive voice, irregular, subject, object

Structures:

- Imperative forms of verbs
- Infinitive forms of verbs, used when stating objectives
- Past tense — *was, were*, and regular verb *rest/rested*
- Passive voice
- Past participles
- Subordinate clauses beginning with *when, so that, where*
- Mass (noncount) nouns taking singular forms of verbs (e.g., *water was poured*)
- Prepositions

Discourse Features:

- Sequential markers *first, second,* etc.
- Format of a science experiment report

Functions:

- stating objectives using infinitive forms
- Listing (apparatus)
- Reporting a science experiment in its entirety

Learning Strategies:

Metacognitive Strategies:

- Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Note taking - during the dictation
- Inferencing - as they are filling in the blanks while taking notes
- Deduction/induction - when writing the experiment report
- Imagery - using science equipment and drawing a diagram
- Elaboration - of prior knowledge about air pressure
- Transfer - of skills of DIT and writing an experiment report
- Auditory representation - when taking notes

Social-Affective Strategies:

- Cooperation, Questioning for clarification, Self-talk

Materials:

- Apparatus for each pair of students:
  - one flask
  - one beaker
  - food colouring
  - water
  - felt marker
- Instructions sheet for distribution to students. See below for one version, with imperative verbs and nouns omitted.

Procedures:

This experiment was adapted from the section "Make a barometer" in John Farndon's *Eyewitness Explorers Weather* (Stoddart Publishing Co., Toronto, 1992, 31).

This lesson utilizes the **Dictated Instructions Technique (DIT)** described in Chapter 3 and used in Lessons 2 and 6 of this unit. See **Lesson 6** for a set of **general procedures** that can be followed in constructing any DIT lesson, and use these procedures to make a specific plan for this lesson on the construction and use of a barometer.

The experiment **Objective, Apparatus,** and **Method** are given below, along with the students' instruction sheet, a diagram, and some specific advice on applying step 11 of the DIT general procedure (see Lesson 6).

Barometer Experiment

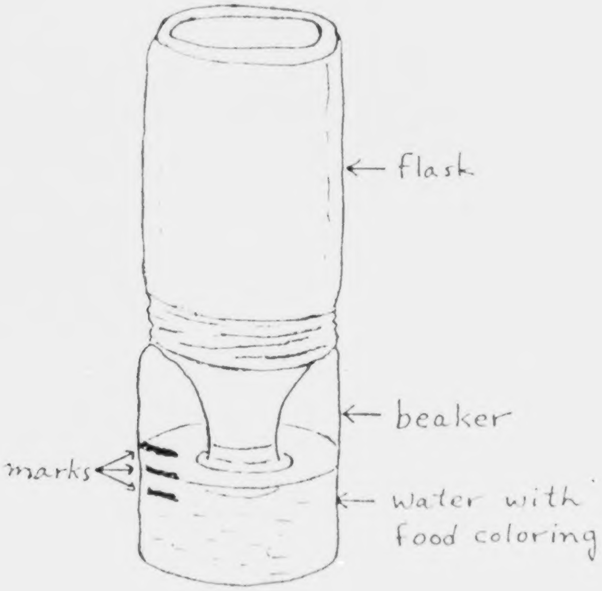
Objective: to construct a barometer and use it to detect changes in air pressure.

Apparatus: Flask, beaker, water, food colouring, felt marker.

Method:

1. Make the barometer on a rainy day when the air pressure is low.
2. Mix the water with some food colouring.
3. Set the flask upside down in the beaker so that it rests on the rim of the beaker and the mouth of the flask does not touch the bottom of the beaker.
4. Remove the flask and pour enough coloured water into the beaker to cover the neck of the flask when it is in place.
5. Mark the level of water in the flask on the beaker.
6. Set the barometer in a place where the temperature is fairly constant.
7. Mark any changes in the water level during the next few weeks.

Note to the teacher: When the water is high in the flask, air pressure is high and the weather should stay fine. When the water is low in the flask, air pressure is low and the weather will be stormy.



Instructions Distributed to Students for DIT

CONSTRUCTING AND USING A BAROMETER

1. ________ the ____________ on a rainy ________ when the ______________ is low.

2. ________ the __________ with some ________________.

3. ________ the __________ upside down in the ____________ so that it rests on the ________ of the ____________ and the __________ of the ____________ does not touch the ____________ of the ____________.

4. __________ the ____________ and ________ enough coloured __________ into the ____________ to cover the __________ of the __________ when it is in place.

5. ________ the __________ of __________ in the __________ on the __________

6. ________ the ____________ in a __________ where the ____________ is fairly constant.

7. ________ any ____________ in the ______________ during the next few __________.

Additional notes on the application of step 11 of the DIT:

Note: See Lesson 6 for a general description of this step.

The instructions for this experiment differ slightly from those in Lessons 2 and 6 (previous applications of the DIT) in an important respect: they contain subordinate clauses whose verbs are in the present tense. E.g.:

1. Make the barometer on a rainy day when the air pressure **is** low.

3. Set the flask upside down in the beaker so that it **rests** on the rim of the beaker and the mouth of the beaker **does** not **touch** the bottom of the beaker.

Instructions 4 and 6 also contain present tense verbs in subordinate clauses.

When the instructions are converted from the imperative to the passive voice in step 11, all verbs must be changed to to the past tense because the students are reporting steps that have been completed in the past. In Lessons 2 and 6, only the main verbs needed to be changed to past tense; this was accomplished by using either *was* or *were* when forming the passive verbs. In this experiment, in contrast, all the other verbs must also be changed to the past tense. E.g.:

1. The barometer **was made** on a rainy day when the air pressure **was** low.

Instruction on this point could proceed as follows.

- What was the first step on your instruction list?

    1. Make the barometer on a rainy day when the air pressure is low.

- What form is the verb in this sentence? (imperative)
- Why? (tells us what to do)
- How would you write this in your science experiment? (in the passive voice)
- How do you write the passive voice? (sentence object becomes subject, verb includes past tense of "to be," main verb changes to past participle)
- How would you change from the imperative to the passive voice in instruction 1? ("The barometer was made ...")
- Good. Notice the capital "T" on "the" and the irregular past participle of "make." What is it? ("made")

- Is there another verb in step 1? (yes) What is it? ("is")
- Yes, "is" is the verb of the part of the sentence "when the air pressure is low." Do you know what a group of words like this is called? (no)
- A group of words containing a verb is called a **clause**. Does this clause have a subject? (yes) What is it? ("the air pressure")
- What tense is the verb "is"? (present) What tense do we want here? Remember, you are reporting something that took place in the past. (past tense)
- What is the past tense of "is"? ("was")

- Good. If we change it, our passive sentence becomes:

1. The barometer was made on a rainy day when the air pressure was low.

- Some of the other instructions also contain clauses, so we need to change the verbs they contain. Let's do step 3 together. Here's what you have:

3. Set the flask upside down in the beaker so that it rests on the rim of the beaker and the mouth of the flask does not touch the bottom of the beaker.

- First, change the imperative verb to the passive voice. What must we do? (move the subject to the front, insert "was," and change the verb "set" to its past participle, which happens to be the same as the imperative).
- Do you see the words "so that"? These words mark the beginning of a very long clause — in fact, the rest of the sentence is a clause containing two verbs. What are they? ("rests" and "does")
- Let's change them to the past tense. What do they become? ("rested" and "did")
- So our completed sentence, in the passive voice and past tense, is:

3. The flask **was set** upside down in the beaker so that it **rested** on the rim of the beaker and the mouth of the flask **did** not **touch** the bottom of the beaker.

- Try to change the other sentences yourselves. Ask me for help if you need it.

[Deduction/induction] *[Questioning for clarification]*

Lesson 11: Acid Rain Experiment - Science (Dictated Instructions Technique)

Objectives:

Content Objectives:

- To learn more about how waste gases dissolve in rain to form acid rain
- To test for acid in rain water

Language Objectives:

Skills:

- Listening -	during discussions; for the oral instructions during the dictation phase of the DIT
- Speaking -	exchanging information and assistance when the students are checking their instructions and performing the experiment
- Reading -	of notes, when students are discussing the experiment method and performing the experiment
- Writing -	taking notes; completing a science experiment report

Linguistic Knowledge:

Vocabulary Development:

beaker, measuring cup, sieve, bowl, rain water, distilled water, cabbage leaves, finely, chopped, pour, strain, compare, acid, acidic, turns, soak, juice, millilitres (ml), equal, adjective

Structures:

- Imperative forms of verbs
- Infinitive forms of verbs, used when stating objectives
- Use of present tense to express hypothetical future in statements like "If the rain water *turns* red, it is acidic."
- Passive voice
- Past participles
- Subject-verb agreement
- Mass (noncount) nouns taking singular forms of verbs (e.g., water was poured)
- Past tense of "to be" - *was* and *were*
- Punctuation - use of colon when listing, or after headings; use of comma in lists
- Adjectives
- Demonstrative pronoun *that* (e.g., Compare the colour of X with *that* of Y)
- Prepositions used with certain verbs - put *into*, pour *over*, pour *into*, strain *through*, add *to*, compare *with*, etc.
- Indefinite and definite articles *a/an, the*
- Pronouns - *they/them*; demonstrative pronoun *that*

Discourse Features:

- Sequential markers *first, second,* etc.
- Format of a science experiment report
- Use of indefinite article to introduce items into a discourse (e.g., "Put X into *a* bowl") and use of definite article to signal items previously introduced (e.g., "Strain *the* cabbage juice ...)

Functions:

- Stating objectives using infinitive forms
- Listing (apparatus)
- Reporting a science experiment in its entirety
- Comparing, using expression *compare* X *with* Y

Learning Strategies:

Metacognitive Strategies:

- Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Note taking - during the dictation
- Inferencing - as they are filling in the blanks when taking notes
- Deduction/induction - when writing the experiment report
- Imagery - using science equipment and drawing a diagram
- Elaboration - of prior knowledge from Lessons 3, 4, and 7 on the water cycle and precipitation
- Transfer - of skills of DIT and writing an experiment report
- Auditory representation - when taking notes

Social-Affective Strategies:

- Cooperation, Questioning for clarification, Self-talk

Materials:

- Apparatus for the acid rain experiment. For each pair of students: 2 finely chopped red cabbage leaves, distilled water, rain water, a bowl, 2 beakers, a measuring cup, and a sieve.

- A method instructions sheet for distribution to the students. See end of lesson for one possible version, with imperative verbs and adjectives replaced by blanks.

Procedures:

This experiment was adapted from the section "Testing for acid rain" in John Farndon's *Eyewitness Explorers Weather* (Stoddart Publishing Co., Toronto, 1992, p. 53)

This lesson utilizes the **Dictated Instructions Technique (DIT)** described in Chapter 3 and used in Lessons 2, 6, and 10 of this unit. See Lesson 6 for a set of general procedures that can be followed in constructing any DIT lesson, and use these procedures to make a specific lesson plan for this lesson on testing for acid rain.

The experiment **Objective, Apparatus,** and **Method** are given below, along with the students' instruction sheet (containing blanks to be filled in during the Presentation phase) and a diagram.

Objective: to test for the presence of acid rain in rainwater.

Apparatus (Materials):

- 2 finely chopped red cabbage leaves
- distilled water
- rain water
- a bowl
- 2 beakers
- a measuring cup
- a sieve

Method (Instructions):

1. Put the two finely chopped red cabbage leaves into a bowl.
2. Pour hot distilled water over the cabbage leaves and soak them for an hour.
3. Strain the cabbage juice through a sieve into a measuring cup. Note the colour.
4. Pour a few millilitres of distilled water into one beaker and pour an equal amount of rain water into another beaker.
5. Add the same amount of cabbage juice to each beaker.
6. Compare the colour of the distilled water with that of the acid rain water.

Note: If the rain water turns red, it is acidic.

Instructions Distributed to Students for DIT:

Test for Acid Rain

1. ____________ the _______ ____________ ____________ ____________ ____________ leaves into a bowl.
2. ____________ ____________ ____________ water over the ____________ leaves and ____________ them for an hour.
3. ____________ the ____________ juice through a sieve into a ____________ cup. ____________ the colour.
4. ____________ a ____________ millilitres of ____________ water into ____________ beaker and ____________ an ____________ amount of ____________ water into ______________ beaker.
5. __________ the ________ amount of ________________ juice to ________ beaker.
6. ____________ the colour of the ____________ water with that of the ____________ __________ water.

Note: If the rain water turns red, it is acidic.

LEARNING LOG FOR LESSONS 6-11

VOCABULARY I KNOW:

Weather Nouns

___ humid
___ dampness
___ relative humidity
___ hygrometer
___ precipitation
___ liquid
___ drizzle
___ rain
___ sleet
___ snow
___ hail
___ temperature
___ droplet
___ breeze
___ fog
___ degrees
___ Celsius
___ flood
___ ice
___ conditions
___ crystal
___ flake
___ snowflake
___ level
___ blizzard
___ "white out"
___ current
___ hailstone
___ layer
___ gust
___ air
___ sun
___ earth
___ atmosphere
___ movement
___ cycle
___ air pressure
___ rain water

Experiment Nouns

___ bar graph
___ chart
___ flask
___ beaker
___ food colouring
___ barometer
___ sieve
___ bowl
___ distilled water
___ acid
___ millilitre (ml)
___ measuring cup

Miscellaneous Nouns

___ oatmeal carton
___ rubber bands
___ cotton
___ shoestring
___ slot
___ description
___ effects
___ diameter
___ beneficial
___ street
___ road
___ points
___ branches
___ damage
___ property
___ journey
___ millimetre (mm)
___ positive
___ shingle
___ frisbee
___ kite
___ fire hydrant
___ curb
___ area
___ volume
___ ground
___ cabbage leaves

Academic English Terms

___ imperative
___ past participle
___ regular
___ irregular
___ idiom
___ literal language
___ figurative language
___ exaggerate
___ tall tale
___ outline
___ narrative
___ homonym
___ introduction
___ body
___ climax
___ conclusion
___ event
___ plot
___ setting
___ problem
___ solution
___ main idea
___ subheading
___ detail
___ indent
___ paragraph
___ clause
___ adjective

Weather Verbs

___ freeze
___ drop
___ float
___ splash
___ collide
___ drift
___ bump
___ ranging
___ stick
___ heat
___ rise
___ sink
___ replace
___ repeat

Experiment Verbs

___ calculate
___ determine
___ record
___ observe
___ boil
___ pour
___ strain
___ compare
___ turn
___ soak
___ equal

Miscellaneous Verbs

___ slot
___ slide
___ slip
___ fit
___ form
___ uproot
___ avoid
___ crawl
___ let go
___ spout up
___ realize

Adjectives

___ consecutive
___ frozen
___ approximate
___ still
___ damp
___ low
___ moist
___ blocked
___ serious
___ sudden
___ huge
___ invisible
___ cool
___ warm
___ lighter
___ upper
___ constant
___ finely
___ chopped
___ acidic

Adverbs

___ exactly
___ extremely
___ still
___ fortunately

Discourse Markers

___ first
___ second
___ third
___ finally
___ last
___ also
___ as well
___ in contrast
___ in conclusion
___ finally
___ suddenly
___ fortunately
___ as a result
___ causing
___ so
___ consequently
___ as
___ meanwhile
___ as follows
___ in other words

CONTENT

I can:

___ construct a hygrometer
___ explain how to measure relative humidity
___ perform and report a science experiment using the headings: Objective, Apparatus, Method, Observations, Conclusion, and Diagram
___ name, identify, and explain the five different types of precipitation and their characteristics
___ distinguish between main and supporting ideas to complete a T-list
___ construct a wind cycle diagram
___ describe how the wind moves through a cycle in a written report
___ understand and explain air pressure
___ construct a barometer and use it to measure changes in air pressure
___ explain how changes in air pressure can signal changes in the weather
___ explain how waste gases dissolve in rain to form acid rain
___ test for acid in rain water

LANGUAGE

I can:

___ write a science experiment report in its entirety
___ state objectives using infinitive forms
___ list apparatus using appropriate punctuation
___ fill in the imperative forms of verbs while listening to dictated instructions
___ write sentences in the passive voice
___ write verbs in the past tense
___ write paragraphs in the correct form, remembering to indent
___ write an expository essay on the forms of precipitation
___ classify information
___ use pronouns to replace nouns
___ combine sentences using conjunctions
___ combine sentences using clauses
___ write an outline consisting of an introduction, body, climax, and conclusion
___ write an exaggerated story or tall tale from an outline
___ explain and give examples of idioms
___ explain and give examples of homonyms
___ write a descriptive report from a cycle diagram
___ write an introductory paragraph and a conclusion

LEARNING STRATEGIES

Using metacognitive strategies (those on the blue sheet), I can:

___ look at headings, subheadings, pictures, and diagrams to predict the contents of a reading passage

____ plan how to accomplish a task before I start it
____ pay attention to selected key words to help me complete a task
____ monitor or check my understanding as I am doing an activity
____ evaluate if I have successfully completed a task

Using cognitive strategies (those on the green sheet), I can:

____ take notes during a dictation to complete answers to questions, a T-list, or the method of a science experiment
____ elaborate upon prior knowledge to complete and understand new tasks
____ transfer previous skills or facts to new tasks
____ use pictures to understand new information
____ use inferencing or guessing when taking notes and performing other tasks
____ group or classify information in categories
____ summarize information from a text on a T-list
____ imagine exaggerated events in my mind as I write about them
____ use resources, such as notes, T-lists, and summaries, to gather information and complete a new task

Using social-affective strategies (those on the pink sheet), I can:

____ ask questions to get more information to help me and my classmates learn
____ cooperate and share information with others as I learn
____ use self-talk or say "out loud" what I am going to write, to hear what sounds best before I write it
____ use self-talk as I perform the steps involved in the method of a science experiment

Lesson 12: Weather Systems Research - Science, Geography, Language Arts
(Research Technique)

Objectives:

Content Objectives:

- To learn how to use the library to find resources for a research project
- To do research on a weather topic and to write a report on it
- To gather information about a weather system or phenomenon (e.g., hurricane, typhoon, cyclone, thunderstorm, monsoon, tornado, Chinook, flood, drought) in order to make a presentation about it at a later date

Language Objectives:

Skills:

- Listening - to instructions; in group discussions
- Speaking - in group discussions; when editing
- Reading - reference materials for specific information; self-produced research reports, when editing them with the teacher
- Writing - a research report

Linguistic Knowledge:

Vocabulary Development:

cause, occur, countries, continents, zones, hemisphere, described, effects, environment, interesting, research, report, reference, reference materials, resources, filmstrips, encyclopedias, dictionaries, extra, specific, particular, expression *make use of*

Structures:

- Subject-verb agreement
- Capitalization of proper nouns
- Use of commas after sentence-initial conjuncts like *first*, and also in lists
- Subordinate clauses
- Coordinating conjunctions *and, but, or*
- Prepositions of place (e.g., occur *in*)
- Personal pronouns *it, they*
- Descriptive adjectives (used to describe weather phenomena)

Discourse Features:

- Paragraph structure
- Organization of a research report
- Sequence markers *first, then, next, finally*

- sequence expression *as follows*
- Exemplifying marker *such as*

Functions:

- Reporting
- Describing
- Defining

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Organizational planning, Selective attention, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Resourcing - using library resources to obtain information
- Imagery - choosing and using resources with good pictures and diagrams
- Note taking - as they find information in their reference books
- Elaboration - of prior knowledge about the weather, when doing their research reports; expanding notes into complete sentences when writing their reports
- Grouping - information on the research outline
- Inferencing - as they are taking notes to fill in the missing parts of their research outlines
- Deduction/induction - when they are writing complete and correct sentences in the paragraphs of their research report
- Transfer - of previous knowledge, writing skills, etc., to assist them in completing their reports

Social-Affective Strategies:

- Cooperation, Questioning for clarification

Materials:

- Books and resources from the school library.
- Outline for weather system research (either statement or question format — see Presentation phase).

Procedures:

Note: This lesson employs the **Research Technique** described in Chapter 3.

I. PREPARATION

Each student chooses a weather system, phenomenon, or condition to research. If the class is a large one, two students may work together on the same topic. Some weather systems or phenomena that could be researched are: hurricanes, typhoons, cyclones, monsoons, tornadoes, thunderstorms, Chinooks, floods, and droughts.

The students go to the library and have the librarian help them to look up suitable books or resources about their topic in the card catalogue or on the computer. They sign out the books and return to the classroom to prepare for the note taking part of their research project.

[Advance organization] *[Resourcing]* *[Cooperation]*
[Imagery]

Strategy Instruction:

[Resourcing]--

Ask:

- What kinds of books are you going to use? (library books, reference books, encyclopedias, dictionaries, filmstrips, etc.)
- How will these books or resources help you? (They give extra information about our topic.)
- When you want to find extra information, where do you think you will find it? (in the library)
- What did you use in the library to help you find your resources or books? (card catalogue and/or computer)
- How did the card catalogue or computer help you? (We just looked up the weather system and it listed all the resources in the library.)
- What does the library contain? (books, dictionaries, encyclopedias, filmstrips, etc.; or, lots of resources) Good. Another name for all these things, besides "resources," is **reference materials**.

- Another way of saying "to use something" in English is to say we "make use of it." For example, what do you use to brush your teeth? (a toothbrush) Yes, so we say that we "make use of a toothbrush" to brush our teeth.
- Will you make use of the resources or reference materials you have found? (yes) How? (to find information about our topics)
- Making use of resources like this is a strategy not listed on the learning strategy sheets. What do you think we could call it? (resourcing)
- Once again, how does resourcing help you? (to find extra information to understand and complete the task)
- Which sheet should we add it to? Is it a type of planning or evaluation? (no) Then which sheet would be suitable? (the green sheet) Why? (It helps us to understand.)
- Can we write a definition of this new strategy called **resourcing**? What should we write? (e.g., "Use RESOURCES such as reference materials.")

[Imagery]--

Show two books, one containing mostly written text and a few pictures, and the other containing many pictures. Ask:

- Which book would you rather use? Why?

- When you were looking for your library resources or books, which books attracted you? (books with pictures, diagrams, etc.)
- Why? (easier to understand)
- Which strategy is that on the green sheet? (Use IMAGES and PICTURES.)
- How do images and pictures help you to understand or remember? (various answers, e.g., they show what happens without a lot of words)

II. PRESENTATION - Listening and speaking

In this phase, the students are presented with the outline they will use to guide their research into the topic they have chosen. The outline they are given can be either in **statement form** or in **question form**. As a general rule, outlines in statement form are more appropriate for ESL students at the low-intermediate level, while those in question form are suitable for students at the high-intermediate or advanced levels. Samples of both types are included here.

Research Outline - Type 1 (Statement Form - for low-intermediate students)

(Name of weather system or condition)

1. There are several causes of a ________________.

   First, ____________________________________

   Then, ____________________________________

   Next, ____________________________________

   Finally, ____________________________________

2. ________________ occur in (Name countries, continents, zones, and hemispheres)

3. A ________________ can be described as follows. ________________

   ____

   ____

4. A ________________ has many effects upon the environment, such as ________

   ____

   ____

   ____

5. Other interesting things about a ________________ are as follows.

   ____

   ____

   ____

Research Outline - Type 2 (Question Form - for more advanced students)

__(Name of weather system or condition)__

1. What are the causes of (a) __________________?

   A. First, ____

   B. Then, ____

   C. Next, ____

   D. Finally, ______________________________________

2. Where do __________________ occur?

   (Name countries, continents, zones, and hemispheres) ____________________

3. How would (a) ______________ be described? ________________________

4. What effects does (a) __________________ have upon the environment afterwards?

5. Are there any other interesting things about (a) ____________________?

The students should be shown how to use their outline to help them perform their research. Choose a particular weather system or condition that has not been selected by the students, and using the overhead, **model** the activity of completing the outline. The students may assist by finding the necessary information in the books and contributing ideas about what to write.

Be sure to emphasize (and demonstrate) that the information entered in the outline should be in **note form**. This is **not** the proper time for writing the report in complete English sentences and paragraphs — that will come later.

[Organizational planning]
[Selective attention]
[Self-monitoring]

[Note taking]
[Resourcing]
[Elaboration]
[Grouping]
[Inferencing]

[Cooperation]
[Questioning for clarification]

Strategy Instruction:

Ask:

- What strategies from the green sheet did we use?

[Note taking]--

- What do you write down as you take notes? (important words or answers)
- When do you take notes? (while reading)
- Is this different from taking notes from a listening activity, or is it the same? (both different and the same)
- How is it different? (We have to read to get the answers, instead of listening for the answers.)
- How is it the same? (We look for the important words, both in reading and in listening.)

- How does taking notes help you? (We complete the task and we remember the information.)
- Have you ever read something, not taken notes, and tried to find it later? (various answers, perhaps examples)
- Besides helping you to remember, what else does taking notes do for you? (saves us time by keeping information in simple form, easy to find)
- Does taking notes as you read help you to understand the information better? (yes)
- Do you always read like this, taking notes as you read the material? (no) When don't you read like this? (when we read stories, newspapers, magazines, etc.) That's right, you don't take notes when you read those things. What you are doing in this lesson is a special type of reading, called **reading for specific information**.

- Do you know what "specific" means? (no) When you read these books about weather, will you find a lot of information in them? (yes) More than you really need to know? (yes) You want to find certain information that will help you complete your outlines, isn't that right? (yes) So you're going to look for information of special types, for example, where your weather system occurs and what causes it. This is called *specific* information — it's the information you're interested in, not **all** the information.

- There's another important word you should know, that means almost the same thing. It's the word **particular**. When you read through the resources you have found, you'll be looking for *particular* information.

[Inferencing]--

- When you are completing the outline by filling in the missing parts, how do you know what to fill in? (intelligent guesses using the key words)
- When you make intelligent guesses to complete the missing parts, which strategy are you using? (inferencing) Which sheet is this on? (the green sheet)
- Are your intelligent guesses or inferences usually correct? (yes)
- How does inferencing help you? (to complete the task or outline)

[Selective attention]-- *[Grouping]*--

Note: Assume that the question version of the outline is used in the following instructional sequence.

- What is the key word in question 1 of the outline? ("causes")
- What are the key words in question 2? ("occur in — countries, continents, zones, and hemispheres") [Discuss these terms with the students.]
- In question 3? ("described")
- In question 4? ("effects ... upon the environment")
- In question 5? ("other interesting things")

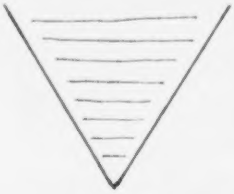
- In number 1, when you are describing the causes of a particular weather condition, what words will help you to describe the order of events? ("first, then, next," etc.)
- How will these words help you? (They keep the events in order.)
- When you are looking for where a particular weather system or condition "occurs" in number 2, what will you be looking for? (countries, continents, zones, and hemispheres)
- Which learning strategy on the blue sheet are you using when you are selecting one or two key words to help you to find or write the information you need? (selective attention)
- How does selective attention, that is, paying special attention to key words, help you? (helps us find or locate the necessary information to complete the task)
- When you find the answers, how do you know where to write them? (beside the key words in the outline)

- Where would you write the answer "the tropics including Asia, Africa, South America, and Australia"? (beside number 2)
- Why? (That's where it belongs, because it answers where the weather condition "occurs.")

- Which strategy on the green sheet are you using when you write the words where they belong? (grouping)

[Resourcing]--
[Elaboration]--

- When you use library books or other reference materials, what strategy are you using? (resourcing)
- Do you understand why we added this strategy to the green sheet?
- How does resourcing help you?
- What do these books or resources give you? (extra information)
- Does this help you to learn new things or **elaborate** upon what you already know? (yes) What is this strategy called? (elaboration)
- What helps you to understand the new information? (what we already know)
- In other words, could you say you start at the bottom and your knowledge expands like this?



- Think about what you knew about weather systems and conditions when we started this unit, and think about what you know now. Have we built upon your prior knowledge, that is, what you already knew about weather? (yes)

III. PRACTICE (First Phase) - Reading and writing

The students will complete the outline by reading their resources or materials and writing down the information as they find it. Although each student has chosen his/her own weather system or condition, they may work together to assist each other in finding the necessary information.

While they are working, be sure to circulate to give students the cues or assistance they need to move ahead. The books consulted will no doubt contain a variety of cues to the different information, and since not all of these cues have been listed on the outline, special help will be of great value to the students as they grapple with the reading/note taking task.

[Selective attention]
[Self-monitoring]

[Note taking]
[Resourcing]
[Grouping]
[Elaboration]
[Inferencing]

[Cooperation]
[Questioning for clarification]

IV. EVALUATION (First Phase) - Listening and speaking

When the students have written all the necessary information to complete the task, they show it to the teacher, who discusses with the students how they are going to write the **first**

draft of their weather system research. This draft will be written in proper English (complete sentences, etc.), so the students will have to move from notes to formal reporting.

Note: If the students have used the outline in statement form, the writing task is fairly straightforward, as many of the structural cues have already been provided. The students will still benefit from the Deduction/induction strategy instruction below, however, as this will reinforce the different structures they encounter here. If the students have used the question version of the outline, the deduction/induction strategy instruction below will be essential in helping them to write their reports.

Strategy Instruction:

[Deduction/induction]--

- Look at question 1. What will your first sentence be? Which words from the question will you use in writing a good sentence to begin this paragraph of your report? [Underline the words as the students identify them.]

1. What are the causes of a ________________?

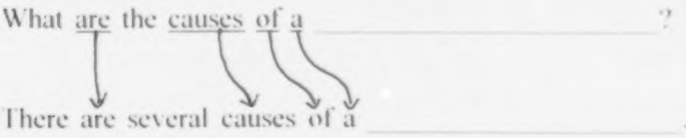
A. First, ______________________________

B. Then, ______________________________

C. Next, ______________________________

D. Finally, ______________________________

- Was there one cause or more than one cause? (more)
- If there were more than one cause, what could we say for "more than one"? (many or several causes)
- What would be the first word of your sentence? ("There")
- What kind of letter does "there" start with? (capital) Why? (first word of a sentence)
- Using the words "there" and "many" or "several," as well as the words underlined in question 1, what would you write? [Using arrows, show how the desired sentence can be formed.]



What are the causes of a ________________?

There are several causes of a ________________.

Integrating discourse markers, capitalization, punctuation, and structures into content-area work:

- When you are writing the causes, do they occur in a certain order? (yes)
- How would you show the sequential order? (by using certain words)
- Which words would you use? ("first, then, next, finally")

- What do these words show? (the order of the causes)
- Where do these words go in your sentences? (at the beginning)
- What kind of letter do you have to use at the beginning of each word? (capital)
- What goes after each of these words? (a comma)
- Is this a lot of information? Would all this information be enough to complete one paragraph? (yes)
- What do you have to remember to do when you start your paragraph? (indent)

- Look at question 2.

2. Where do ______________________ occur?

- What word goes in the blank? (the weather system we're reporting) Singular or plural here? (plural) How do you know? (no "a" before the blank; also, auxiliary verb "do")
- Good. Let's put an "s" into the blank, to show that it's plural. Also, let's underline the key word here. What is it? ("occur")

2. Where do ______________(s) occur?

__________(s) occur ____

- Is this new information, or the same kind of information you wrote when answering question 1? (new information)
- If this is new information, would it be in the same paragraph or in a new paragraph? (new paragraph)
- What do you have to do to show it is a new paragraph? (indent)

- What word would you use after "occur" in your answer to question 2? ("in")
- What would you write? ("__________(s) occur in")
- What would you write after "in"? (the countries, continents, zones, or hemispheres)
- When you are writing the countries, continents, zones, or hemispheres, what do you have to remember to put on the first letters of the places you name, for example, Asia? (capital letter) Why? (the name of a particular continent — a proper noun)
- What other words will you capitalize? (countries, zones, hemispheres)
- When you are listing these things, what do you have to put between them? (commas)

These are some examples of how the teacher and the students can review all the necessary structures to complete the task of writing a research report.

Other structures which can be integrated into content-area work of this nature are as follows.

- **Pronouns**. E.g., a monsoon → it; monsoons → they

- **Adjectives**. Used, for example, in *describing* the weather condition.

- **Subordinate clauses**. E.g.:

A ______________ can be described as ________________ *because it* ____.

- **Coordinating Conjunctions**. Used when combining sentences.

These different structures can be discussed with the students by referring to the outline completed earlier by the teacher for modeling purposes. A second type of modeling can take place at this point, as the students are shown how to elaborate notes into complete sentences and paragraphs.

[Self-evaluation]	*[Deduction/induction]*	*[Cooperation]*
	[Transfer]	*[Questioning for clarification]*
	[Elaboration]	

III. PRACTICE (Second Phase) - Writing

Each student writes the information into proper sentences and paragraphs.

[Self-monitoring]	*[Deduction/induction]*
	[Transfer]

IV. EVALUATION (Second Phase) - Reading and writing

When the students have completed the first drafts of their research reports, they edit them with their partners before presenting them to the teacher. As each student reads his or her report to the teacher, the report is edited for the final draft.

[Self-evaluation]	*[Deduction/induction]*	*[Cooperation]*
		[Questioning for clarification]

V. FOLLOW-UP - Reading

The students draw or find pictures of their particular weather condition. They use these to illustrate their reports, which are written below the pictures.

Once the research reports are completed, the students practise reading them aloud in preparation for the class presentations to follow in the next lesson.

After the presentations (i.e., after Lesson 13), the research reports of the various weather conditions are displayed on the bulletin board. This provides the students with visual reinforcement of their projects and their presentations.

Lesson 13: Weather Systems Presentations - Science, Geography, Language Arts (Presentations Technique)

Objectives:

Content Objectives:

- To learn how to present a project report to the class
- To learn about a variety of weather systems in detail
- To learn the use of an outline to summarize information

Language Objectives:

Skills:

- Listening - to oral presentations; for information; to take notes
- Speaking - giving a rehearsed presentation; in group discussions; answering questions
- Reading - a research project report orally; summaries (to give answers)
- Writing - taking notes

Linguistic Knowledge:

Vocabulary Development:

All the new vocabulary associated with the presentations: e.g., location, occur in, countries, continents, zones, hemispheres, description, described, effects, environment, interesting, etc.; summary, summarize, category, categorize, respectively, prior, previous, elaborate, elaboration, expand upon, recall, severe, precaution

Structures:

- Adding suffix *-ize* to derive verbs from nouns
- Adding suffix *-ion* to derive nouns from verbs (see Lesson 3 also)
- Adding suffix *-ive* to derive adjectives from verbs (e.g., *cooperate* - *cooperative*)
- Present tense to express scientific or habitual truths
- All other structures listed in Lesson 12 (research lesson)

Discourse Features:

- The rhetorical organization of a research report
- Sequence markers *first, next, then, finally*

Functions:

- Reporting and describing
- Summarizing in point form, using a chart

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Note taking - taking notes during oral presentations
- Summarizing - making summaries in point form, using a chart
- Grouping - information under appropriate headings
- Elaboration - expanding prior knowledge of weather systems
- Inferencing - guessing to complete the missing parts of summaries
- Auditory representation - playing back the orally-presented information mentally as they are note taking (not on the green sheet)
- Transfer - of information about their own project to the summaries of other students' projects (not on the green sheet)

Social-Affective Strategies:

- Cooperation, Questioning for clarification, Self-talk

Materials:

- A summary sheet (one for each presentation) containing the same categories with the same key words in the same order as on the outline the students used to compile information for their research report in Lesson 12. See the next page for this presentation summary sheet.

Presentation Summary Sheet

Causes:

1.
2.
3.
4.

Location:

Description:

Effects:

Other:

Procedures:

Note: This lesson utilizes the **Presentations Technique** described in Chapter 3. Since only two or three presentations can be given in any class period, this "lesson" will extend over a number of consecutive periods.

I. PREPARATION

The students are aware of the order of the presentations, and have practised reading their research project reports during a previous lesson and at home.

They are each given a copy of the presentation summary sheet on the previous page, and its format is explained to them. They are told that the summary contains the same categories (including key words) in the same order as the questions on their research project outline (see Lesson 12).

[Selective attention]	*[Note taking]*
[Organizational planning]	*[Summarizing]*
[Advance organization]	*[Grouping]*

Strategy Instruction:

[Note taking]--

Begin by instructing the students to take out their **green** learning strategies sheets. Then ask:

- Why were you given this summary outline? (to fill in)
- When? (during the presentations)
- What strategy will you be using as you fill in this summary outline? (note taking)

[Summarizing]--

- As you are note taking, what will you be filling in? (information)
- What kind of information? (important ideas about the weather system being presented)
- When you have taken notes of just the important ideas, what other strategy have you used? (summarizing)
- How many weather conditions are we presenting today? (2)
- How many weather conditions do we have to present altogether? (the number of students, or pairs if working in pairs, in the class, e.g., 10)
- How many summaries will you have? (10)
- Yes. Then you will know about all the weather systems or conditions, and not just the one you researched.

[Grouping]--

- When you are writing your summaries, where would you write "Asia"? (beside "Location") Why? (It belongs there.)
- How do you know? (That's where the weather system takes place or is located.)
- What strategy are you using when you write the words where they belong? (grouping)
- That's right — you put the information into groups called "causes," "location," and so on. There is an important word in English which means the same as "group," when used in this sense. The word is *category*. When you put information into groups, we say you are placing it in different *categories*.
- Look at your summary sheet again. What are some of the important information categories you will list the information under? (causes, location, description, effects, other)

- Now look at your **blue** learning strategies sheet.

[Selective attention]--

- When you are listening for specific information during the presentations, what key words will you be listening for in these different categories?

  - **Causes?** (causes, first, then, next, finally)
  - When you hear "first," where will you write the information? (beside number 1, under "causes")
  - When you hear "then," "next," and "finally," where will you write the information? (beside numbers 2, 3, and 4)
  - You mean the information after "then" goes after number 2, the information after "next" goes after number 3, and the information after "finally" goes after number 4? (yes)
  - When I asked you where you will write the information after "then," "next," and "finally," you said "beside numbers 2, 3, and 4." The trouble with your answer is that it doesn't tell anything about the way these things go together. How can you indicate that "then" goes with number 2, "next" goes with number 3, and "finally" goes with number 4? There is a way to do this in English, using one simple word. That word is *respectively*. When you say where you will write the information after "then," "next," and "finally," you should say "beside numbers 2, 3, and 4 **respectively**." The word "respectively" indicates that "then" will go with number 2, and so on. Remember this word — it can be very useful sometimes.

  - **Location?** (occur in)
  - What will you be listening for after the key words "occur in"? (countries, continents, zones, and hemispheres)

  - **Description?** (can be described as follows)
  - What is the root word of "description"? (describe)
  - What does "describe" mean? (tell what it looks like)

  - **Effects?** (effects upon the environment, such as)

  - **Other?** (other interesting things are)

- When we listen for, or pay attention to, key words, what strategy are we using? (selective attention)

[Organizational planning]--

- Let's review the task. What are you going to do? (listen to the presentations and take notes to fill in the summaries)
- How should the presenter read? (slowly)
- What will you be listening for? (key words)
- Do you think you will get all the information from the first reading or will the presenter have to read his or her report more than once? (more than once)
- When you have most of the information, you will be divided into groups to compare and check your answers. The presenter will correct the answers with you.
- What strategy are we using here, as we think about the task and what we will do to complete it? (planning what we will do)
- When do you usually plan what you will do? (before we start the task)
- How does this help you? (to learn how to do the task successfully)

II. PRESENTATION

A designated student stands at the front of the room, shows a picture of his or her weather system or condition, and reads his or her project report slowly to the class. As the presenter reads, the students listen and take notes to complete their summaries.

[Selective attention]
[Self-monitoring]
[Note taking]
[Summarizing]
[Grouping]
[Elaboration]
[Auditory representation]
[Transfer]
[Cooperation]

Strategy Instruction:

After the first reading, ask the students:

- Did you complete the summary? (no)
- Do you need another reading? (yes)
- Let's have __________________ read his/her research project report one more time so you can complete the summary and check your answers.

The presenter reads the report at a regular rate of speed. He or she may reread the report a third time if necessary.

This procedure provides the presenter with a purpose for reading clearly and carefully to the class instead of rushing through the presentation. This also promotes a positive atmosphere for the presenter and the class.

Using the strategy of selective attention during this procedure gives the students a purpose for listening to the presenter instead of "tuning out" until it is their designated time to present.

Another advantage to this technique is that all of the students will have all of the information about all of the weather systems or conditions (not just their own).

III, IV. PRACTICE AND EVALUATION

After each presentation, put the students into pairs or groups. Set a definite time limit (e.g., 5 minutes) for them to work together in comparing and correcting their answers.

When the task has been completed, the **presenter** plays "teacher" and corrects the information with the students, using the summary outline that the teacher has written on the chalkboard. The presenter fills in the title (e.g., **Monsoons**). He or she then asks the class questions to elicit the correct responses for each of the categories in the summary. E.g.:

- What are the causes of a monsoon? (students answer with details from part I of their summaries)

The students raise their hands and provide the presenter with the information. The presenter writes it on the board correctly, checking the spelling and information against his or her own research project report (which is correct). The other students check the presenter's summary information against their own summaries and correct them.

Point form and punctuation are taught and integrated into the content material at this point.

V. FOLLOW UP - Strategy Instruction

- Let's look at the **blue** learning strategy sheet.

[Organizational planning]--

- What strategies did you use to learn more? (planning)
- When did you plan? (before the presentation, when we were preparing to note take by going over the summary)

[Selective attention]--

- What other strategy did you use? (selective attention)
- When did you use selective attention? (before and during the presentations, when we were discussing which words to listen for in the presentations)

[Self-monitoring]--

- What other strategy, besides the planning strategies? (monitoring)
- When? (during the presentation, when we were listening and note taking) What did you do then? (monitor how we were doing)

- How well did you succeed? Did you get all of the information from the first reading? (no) From the second reading?

[Self-evaluation]--

- You used one other strategy from the blue sheet. What is it? (evaluation)
- When? (after we finished listening, and while we were correcting)
- Did I evaluate you or did you evaluate yourselves? (We evaluated ourselves.)
- How did you do?
- Was most of your information correct?

- How did these metacognitive learning strategies on the blue sheet help you to learn more? (They helped us learn about all weather systems besides our own.)

- Good. Now let's look at the **green** learning strategies sheet.

[Note taking]--

- What learning strategy on the green sheet did you use to help you understand and remember? (take notes)
- When did you take notes? (during the presentation)
- How did that help you? (It helped us remember the information.)
- What did you write down? (important ideas)

[Summarizing]--

- What other learning strategies from the green sheet did you use as you were note taking? (summarizing)
- When did you summarize? (as we listened for important ideas or key words to fill in the outline)
- What is the root word of "summarize"? ("summary")
- What is the outline called? (a summary)
- What was the summary similar to? (the questions used to do the research project)
- Do you think I did that on purpose? (yes)
- Which is easier to understand, a paragraph about the weather system or the summary? (summary)
- Why? (point form, important ideas)
- Which would you rather study for a test? (a summary)
- Do you think you could make your own summaries for other subjects, to help you study for tests? (yes) How? (write only the important ideas in point form, with headings)

[Grouping]--

- What other strategy did you use when you were note taking? (grouping)
- How did you group? (When we heard a word, we had to know where to write it in the summary — under which heading or category.)

- Do you think doing your own research project helped you to group the words during the presentation? (yes)
- There is another word for "groups" — do you remember what it is? ("categories")
- What is the verb that comes from the noun "summary"? (summarize) What do you do to "summary" to get "summarize"? (take off the "y" and add "ize")
- Is the word "category" a noun or verb? (a noun) How do you know? (Categories are things; also, you can say "a category" or make it plural — "categories")
- Good. Now, can you guess the verb that comes from "category"? Use the same rule as we discovered for "summary." ("categorize") Yes. How did you get this? (drop the "y" and add "ize")
- That's right. Now, how does **categorizing** words together help you? (makes them easier to understand and remember)
- Could you do this with other subjects? (yes)

[Elaboration]--

- You used another learning strategy on the green sheet. Do you know what it is? (elaboration — if they cannot identify it, tell them)
- What kind of word is "elaboration"? (noun)
- What is the root word of "elaboration"? ("elaborate") What kind of word is "elaborate"? (verb)
- How do you form the noun from the verb, that is, form "elaboration" from "elaborate"? (drop the "e" and add "ion") Do you remember this rule from our lesson on the water cycle? Can you name some other pairs like this? (precipitate - precipitation, evaporate - evaporation)

- What does "elaborate" mean? (to expand or to give more information)
- What are you expanding? (our prior knowledge)
- What is the root word of "knowledge"? (know)
- What does "prior" mean? (before or previous)
- What does "elaborate prior knowledge" on the green sheet mean? (expand upon what you already know)
- How did you do this?
- What did you know yesterday?
- What did you learn today?
- If you had not researched a weather condition yourself, would you understand the presentation today or would it have been difficult? (difficult)

Other cognitive strategies not on the green sheet (discussion is optional, depending upon your students and their knowledge of the learning strategies):

[Auditory representation]--

- As you were note taking, what did you do? (listened for specific words)
- Did you know when you heard an answer you were waiting for? (yes)
- What did you do when you heard the answer or key words? (wrote them down)
- As you wrote down the words, what were you thinking about? (the key words)

- Did saying the words in your head help you to write them down? (yes) How? (It helped us to remember the words or parts of the words long enough to write them down on paper.)
- Another word for keeping words in your head is "recall." Which came first, the recalling or the writing? (First we recalled the words; then we wrote them.)
- Could you take notes without recalling the words? (no)
- Next time you want to remember something important that you heard, what should you do? (repeat it in our heads, then write it down)

[Transfer]--

- As you took notes today, did you make use of previous knowledge? Were you helped by things you already knew? (yes)
- Can you name some of these? (previous vocabulary; note taking skills; summarizing information in abbreviated form)

- How did all these cognitive learning strategies on the green sheet help you?
- Do you understand the research project reports that were presented today? (yes)
- If I asked you a question about a weather system or condition that someone here has studied, could you all answer it? (yes)
- Why? (because we have the information in a summary)
- Turn your papers over. [Ask some question about the presentation which they have just heard.]
- How did you remember this so easily?

Turn next to the **pink** learning strategies sheet, and conduct the same sort of discussion to make the social-affective strategies clear to the students.

- What learning strategies from the pink sheet helped you and others to learn?

[Cooperation]--

- What kind of word is "cooperation"? (noun) What is the verb? ("cooperate") How is the noun formed from the verb? (drop the "e" and add "ion") Which similar pair did we study earlier? (elaborate - elaboration)
- Did the presenter cooperate with you today? (yes) How? (He/she read slowly, so we could take notes.) Yes, he/she was very **cooperative**.
- What kind of word is "cooperative"? (adjective) Yes, we say "a cooperative person" or "a person who is cooperative." How do we form the adjective from the verb "cooperate" (drop the "e" and add "ive")

- Did you use the strategy of cooperation any other time? (when we were comparing and correcting our outlines after the presentation)
- When else? (when correcting the outline with the presenter)
- How? (We gave the presenter the information to fill in the summary.)

[Questioning for clarification]--

- Look at the pink sheet again. What other learning strategies did you use? (asking questions)
- When? (when we were comparing and correcting with our partner or our group)
- When else? (during the correction with the presenter)
- Were most of your answers correct? (yes)

[Self-talk]--

- When you were the presenter, and you wrote the information on the board, what did you do as you were writing? (said the words and spelling to myself)
- Did that help you? (yes)
- How? (made it easier to write it down)
- Why? (because I was thinking out loud about what I was writing)
- In other words, it helped you to focus upon what you were writing? (yes)
- Were you nervous?
- Did self-talk or telling yourself what to write make you less nervous? (yes - because I had to think about what I was doing)

- Great! Do you think these learning strategies help you to learn, understand, and remember? (yes)
- Please read your summaries to me before you leave.

Extended Geography Activity:

Once all the presentations have been completed, work with the students in listing all the weather systems and grouping them according to their season of occurrence, **winter** or **summer**. Then rank the weather systems in each category according to their relative severity, from least severe to most severe. Discuss precautions people should take to protect themselves against the most severe weather conditions. (The authors would like to thank Linda McDowell for suggesting this activity to us.)

Lesson 14: Subtraction of Integers - Math, Geography

Objectives:

Note: The topic of weather in general offers the potential for integrating a number of different types of mathematical problems leading to the practice of a variety of math skills. Percentage problems, algebraic problems involving conversion from Celsius to Fahrenheit scales, and calculation of wind chill factors according to a formula are just a few examples. In this lesson we have chosen to focus on the rules for adding and subtracting positive and negative integers, a topic that emerges naturally from a consideration of the thermometer as a kind of number line. This lesson would be most appropriate for a class of grade 8 or senior 1 (grade 9) students, or even for a class of senior 2 (grade 10) students who needed help in mastering fundamental mathematical operations.

Also worth noting here is the fact that our main emphasis is on the development of the students' academic language and proficiency in using learning strategies. This is not to say that the mathematical skills practised here are not important. But inasmuch as this is an ESL class where the goal is **content-based language instruction** (see page 1), we are primarily concerned that the students learn the language needed to express mathematical concepts, understand mathematical problems, etc.

Content Objectives:

- To learn (or review) the rules for adding and subtracting positive and negative integers
- To complete a set of math word problems involving subtraction of integers
- To find information in a comprehensive weather report
- To learn the locations of the major cities of Canada

Language Objectives:

Skills:

- Listening - to instructions about the rules for adding and subtracting integers
- Speaking - in pair discussions; when giving answers to questions
- Reading - interpreting a comprehensive weather report; reading math word problems
- Writing - answers to word problems in complete sentences

Linguistic Knowledge:

Vocabulary Development:

positive, negative, positive sign, negative sign, minus, number line, horizontal, vertical, subtract, difference, add, sum, opposite, temporarily, whole number, integer, maximum, minimum, high, low, decrease, increase, prediction, predicted, actual, overnight, considering, map, atlas, province, territory

Structures:

- Use of suffix *-ly* to derive adverbs from adjectives, e.g., *horizontal/horizontally, vertical/vertically*
- Comparative forms of adjectives with *than*, e.g., *higher/lower than, warmer/colder than*
- A variety of sentence forms containing comparisons, expressions of difference, etc.
- Superlative forms of adjectives, e.g., *lowest, highest*
- Future tense with *be*: *will be*
- Past tense
- Preposition *between* with the word "difference" - *the difference between*

Discourse Features:

- Use of *while* to express simultaneity, e.g., "the temperature in this room is 22°C, *while* the temperature outside is -13°C."
- Use of *considering* to introduce a qualifying phrase, e.g., "*considering* maximum temperatures only"

Functions:

- Comparing and contrasting

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Selective attention, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Imagery - using a thermometer as a number line; using a map
- Transfer - of math skills to completion of a geography activity; of skills in reading a thermometer to calculating with integers
- Deduction/induction - when writing their answers in complete sentences
- Elaboration - of numerical answers into full sentence answers
- Resourcing - using newspaper reports and atlases as sources of information

Social-Affective Strategies:

- Cooperation, Questioning for clarification

Materials:

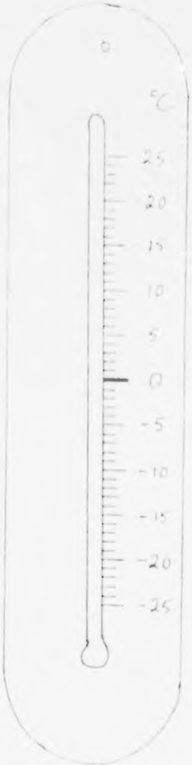
- A thermometer
- Two different copies of the "Today's Weather" section from the *Winnipeg Free Press*. The samples in this lesson were taken from the issues of Dec. 21 and 22, 1993.
- A sheet of math word problems (see Practice phase)

Procedures:

I. PREPARATION

Show the students a thermometer (in degrees Celsius) and discuss how the number scale is constructed. Emphasize that the **positive** temperatures appear above the zero point (0°C) and the **negative** temperatures appear below. Point out that people often use the word "minus" to mean "negative." Write down some sample temperatures to illustrate the notational difference between positive and negative numbers, e.g., "the temperature of this room is 22°C, while the temperature outside is -13°C."

Draw a large thermometer scale on the chalkboard, marking in each 5 degree increment but showing each individual degree from -25°C to 25°C, as shown.



Tell the students that this is a good example of a **number line**, a line in which the numbers are arranged from negative to positive, with zero separating them (although in mathematics a number line is usually drawn horizontally rather than vertically). Point out that the numbers above zero have a **positive sign (+)**, which we don't write. The numbers below zero have a **negative sign (-)**, which we always write. Ask:

- Is 25 the highest temperature or number on this line? (no) Can I go higher? (yes) How high? (as high as you want to go)
- What is the lowest temperature or number *marked* on the line? (-25) Can I go lower? (yes) How low? (as low as you want to go)

- Good. But because the board isn't big enough to contain more, I'll just leave this the way it is. We're going to use this line to learn how to subtract positive and negative numbers.
- Before we get to that, however, I'd like you all to draw a copy of this thermometer or number line in your notebooks. Use a ruler, and try to make a neat job of it.

Circulate and help the students construct their number lines in the form of a thermometer. In later lessons this can be transformed into a horizontal number line, but for the moment it will be easier for them to visualize this as a temperature scale. This will also be appropriate to this lesson, which focuses on the subtraction of temperatures.

[Advance organization] *[Imagery]*
[Transfer]

II. PRESENTATION

The main activity in this stage is a presentation (or review, depending on the proficiency of the students) of the rules for adding and subtracting integers (i.e., positive and negative whole numbers). Conduct a discussion similar to the following.

- Take a look at this number line (referring to the "thermometer" on the board). Which is the higher number, 15 [mark it] or 5 [mark it]? (15) Is 15 a higher number than 20? (no) When you are comparing two numbers on the number line, where is the higher one? (above the lower one) So the higher number is always higher on the number line? (yes)
- So 15 is higher than 5, because it's above it. How much higher is it? (10)
- How did you find that? Could you count on the line from 5 to 15? Would that tell us? (yes) Let's try it — 1, 2, 3, (counting), ... 10. Yes, 15 is 10 higher than 5.
- But there's a much easier way to find out how much higher it is. How? (just subtract: 15 - 5 = 10)
- Good. Now, another way of saying one number is higher is to say there is a **difference** between them. What is the difference between 15 and 5? (10) And how do you find the difference? (subtract)

- Let's do another example. What is the difference between 22 [mark it] and 6 [mark it]? Let's count from 6 to 22 — you do that on your number lines. [Give the students a few moments to do this.] What is the difference, by counting? (16) Can we find this more quickly? How? (subtract: 22 - 6 = 16)

- Now let's look at a harder one. What is the difference between 10 and -5? [mark them] First count, starting at -5. [Give them a moment to do this.] What is the difference? (15)
- What if we subtract to find the answer? What can we write down, as our subtraction problem? **(**10 - (-5)**)**
- Yes, we are going to have to subtract a negative number from a positive one. How do we do that?

At this point you can either elicit from the students or (if necessary) tell them the rule that the **subtraction** of a **negative** number can be reinterpreted as (changed to) the **addition** of a **positive** number. Thus:

10 - (-5) = 10 + (+5) = 15

Give a few more sample questions, making sure the students can answer them before moving on. Omit the positive marker on the second number in these examples, as it is not necessary (unmarked numbers are automatically positive). E.g.:

9 - (-4) = 9 + 4 = 13
1 - (-17) = 1 + 17 = 18
23 - (-23) = 23 + 23 = 46

It would be a good idea to reinforce their intuitive understanding of this rule by referring to the thermometer "number line" in each case and showing that the answers obtained through the application of the rule are correct.

- Now let's look at a different kind of question. What is the difference between -5 and -20? Instead of counting, let's first subtract: -5 - (-20) = ? What should we do, if we use our rule? (change -20 to 20 and add)
- Yes. We get: -5 - (-20) = -5 + 20 = ? Here we have to add a negative and a positive number. How do we do that?

At this point it will be necessary to conduct a discussion (or review) of the rules for **adding** positive and negative integers. Students who are unfamiliar with these rules will find them confusing, since the addition of oppositely-signed numbers actually requires the mental operation of subtraction. The explanation could proceed roughly as follows, though this account may be rather brief in comparison to what might actually be required, depending on the mathematical experience of your students. Additional examples can easily be added, however.

- You already know how to add positive numbers. What is the sum of 7 and 15? We write this 7 + 15 = ? (22) Yes. Remember that finding the **sum** always means you have to **add**. What is the opposite of "sum"? ("difference")
- Now we want to look at how to add positive and negative numbers. First look at the case where we add two negatives, e.g., -6 + (-4) = ? What do you think the answer is? (-10) Why? (various answers)
- Suppose the temperature started at 25°C. Then it dropped 6° and then dropped another 4°. What would the new temperature be? (15°) Why did I say "dropped" here? (because adding -6 would make it drop, and adding -4 would make it drop some more — the temperature would go down 10°)
- When you say "the temperature would go down 10°," this would be like adding -10 to it? (yes) So adding -6 + (-4) is the same as adding -10? (yes) Then we know that -6 + (-4) = -10? (yes)
- Let's do another. What is the sum of -11 and (-4)? That is, what is -11 + (-4)? (-15)
- The rule is simple, then. If both numbers are negative, what do you do when you add? (just add the numbers and make the answer negative)

- Good. Let's review.

  (a) Positive + Positive, just add — e.g., 3 + 8 = 11
  (b) Negative + Negative, just add — e.g., -7 + (-5) = -12

- But there's one more case to be examined. What is it? (The numbers have opposite signs — one is positive and the other is negative.) Yes. Consider the following example: 10 + (-5). What do we do here? Just add? (no) Why not? (The numbers have different signs — you can add only if they have the same sign.)
- Suppose you found 10 dollars (+10) and then lost 5 dollars (-5). How much money would you have left? (5 dollars) So 10 + (-5) = 5? (yes)
- Let's look at another example. Suppose the temperature rose 20° and then dropped 4°. How much higher would it be than before? (16°)
- If we consider a rise in temperature to be positive, then what would a drop in temperature be? (negative) Good. So in this example, the 20° would be positive and the 4° would be negative, right? (yes)
- So the result of adding the two temperature changes, 20° + (-4°), would be 16°? (yes) So it seems that 20 + (-4) = 16. (yes)
- Look at our two examples so far: 10 + (-5) = 5, and 20 + (-4) = 16. What is the rule for adding two numbers that have opposite signs? (subtract the numbers) So it seems, since 10 - 5 = 5 and 20 - 4 = 16. Why don't you try another example using this rule: 17 + (-7) = what? (10) So if the temperature rose 17° and then dropped 7°, it would be a total of 10° higher than before? (yes) Does the rule to subtract work here? (yes, 17 - 7 = 10)
- How about this one: 6 + (-11)? Suppose the temperature rose 6° and then dropped 11°. Would it be higher or lower than at the start? (lower) By how much? (5°) So since it ends up lower, the total has to be written as a negative, -5°? (yes) Then we can write 6 + (-11) = -5? (yes) Does the subtraction rule work here? (yes, 11 - 6 = 5).
- But why is the answer negative here? It wasn't negative in our other examples. (because -11 is bigger than 6) Well, it isn't really a larger number; 6 is actually a bigger number than -11, because it's higher on the number line. What you mean is that 11 is a bigger number than 6, so the total will have to be a "drop," in temperature, or negative. (yes)
- So the rule for adding numbers of different signs is this: **Ignore the signs temporarily, and subtract the two numbers. The answer will then have the sign of the number which is numerically larger.** [Note: You will have to explain the word *temporarily*.]
- Let's do a few more examples, using this rule.

  13 + (-7) = ?
  2 + (-10) = ?
  (-4) + 21 = ?
  (-18) + 10 = ?

- Now that we have seen how to add positive and negative numbers, let's go back to the problem we were looking at before: What is the difference between -5 and -20? How do we find the difference? (subtract) If we subtract the two numbers, we have: -5 - (-20) = ? How do we subtract? (change the sign of the second number and add)

- Then we get -5 + (+20) or -5 + 20 = ? You know how to add two numbers with different signs now — what is the answer? (15) Why? (Subtract the numbers and take the sign of the larger.) Good. Let's count between -5 and -20 on the number line, to see if the difference is 15: 1, 2, 3, ... 15; yes, that's right.
- One more example. What's the difference between -14 and -6? If we subtract, we get (-14) - (-6) = (-14) + 6 = ? (-8) Yes, the difference is -8. How far apart are the two numbers? (8) What does the negative answer mean? (We subtracted the higher number from the lower one.)
- What if we subtracted the other way? We get -6 - (-14) = -6 + 14 = 8.

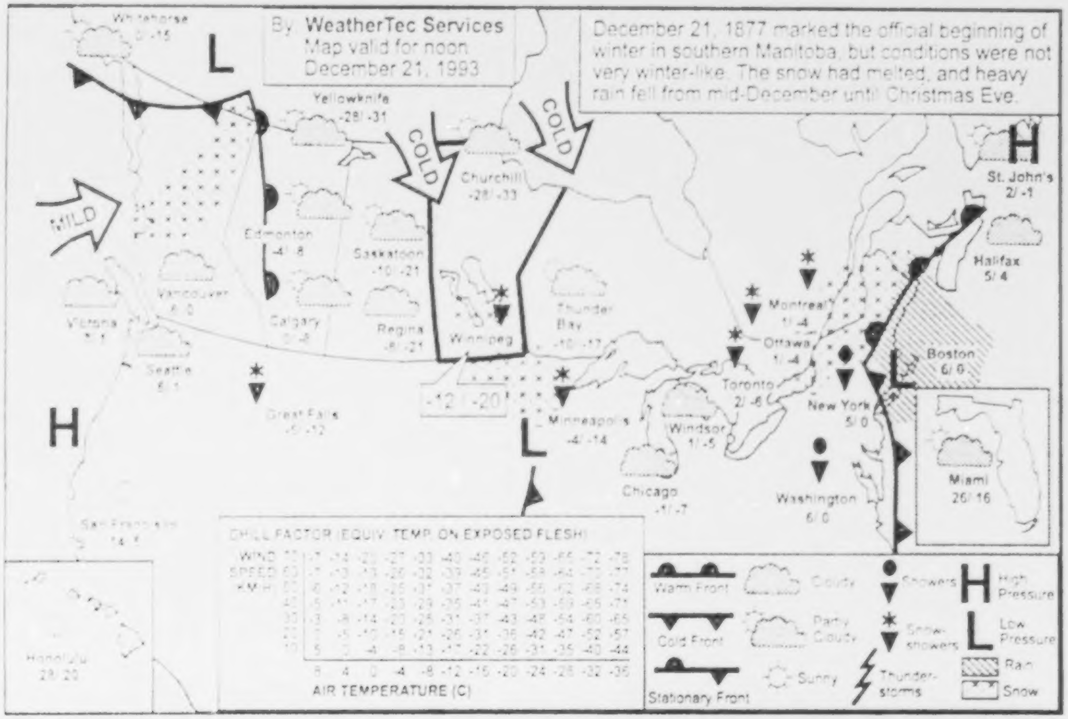
- So far I have talked about adding and subtracting "positive and negative numbers." There are lots of different kinds of numbers, however, and we have been working with only one kind. Is 1/2 a number? (yes) How about 3/4? (yes) How about 6.375? (yes)
- But we haven't been working with numbers like this. We have been working with **whole numbers**. Do you know what whole numbers are? (not fractions — numbers like 1, 2, 3, ...)
- Yes, whole numbers are not fractions; they are "whole." What about zero — is it a whole number? (yes) What about negative numbers like -1, -2, -3, etc.? Are they whole numbers too? (yes)
- Well, you're half right; in a way they are, of course. But we're going to agree that the whole numbers are all positive, except for zero. That is, the whole numbers are 0, 1, 2, 3, ... Is 7,376,281 a whole number? (yes)
- But if we agree that whole numbers are positive (or zero), we have a problem, because we have been working with the negative numbers too. We need a name for all the positive and negative numbers that are not fractions. Does anyone know what it is? ("integers") We call the set of numbers { ..., -3, -2, -1, 0, 1, 2, 3, ... } the set of **integers**. What is the highest integer? (There isn't one.) What is the lowest integer? (There isn't one.)
- Good. In our calculations during this period, we have been working with integers, haven't we? (yes) What have we been doing with them? (adding and subtracting them)

This completes the formal explanation of the rules for adding and subtracting integers. It is intended as an introduction, an opportunity to capitalize on the similarity of the thermometer to a number line in order to familiarize students with these operations and some of the terminology associated with them. For some students, it will be a useful review; for others, it will be a good introduction to concepts they will later encounter in mathematics classes.

Now distribute copies of the "Today's Weather" section excerpted from a current copy of the *Winnipeg Free Press*. On the next page is a copy of this section for Dec. 21, 1993, intended as an example only. The students will by now be familiar with most of the weather concepts and terminology on this graphic, but it would be a good idea to go over it quickly and discuss the main sections: the map of Canada, the Winnipeg Area Forecast, Manitoba Conditions Yesterday, and the Extended Forecast.

Today's Weather

C	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25
F	95	86	77	68	59	50	41	32	23	14	5	-4	-13


Whitehorse
0/ -15
L
MILD
Yellowknife
-28/ -31
COLD
COLD
Churchill
-28/ -33
Edmonton
-4/ -8
Saskatoon
-10/ -21
Vancouver
8/ 0
Victoria
8/ 1
Calgary
0/ -8
Regina
-8/ -21
Winnipeg
Thunder Bay
-10/ -17
Seattle
6/ 1
Great Falls
-5/ -12
-12 / -20
Minneapolis
-4/ -14
H
L
San Francisco
14/ 5
Honolulu
28/ 20
Chicago
-1/ -7
Windsor
1/ -5
Toronto
2/ -6
Ottawa
1/ -4
Montreal
1/ -4
New York
5/ 0
Washington
6/ 0
Boston
6/ 0
L
Halifax
5/ 4
St. John's
2/ -1
H
Miami
26/ 16
CHILL FACTOR (EQUIV. TEMP. ON EXPOSED FLESH)
WIND SPEED KM/H
AIR TEMPERATURE (C)
8 4 0 -4 -8 -12 -16 -20 -24 -28 -32 -36
Warm Front
Cold Front
Stationary Front
Cloudy
Partly Cloudy
Sunny
Showers
Snow-showers
Thunder-storms
H High Pressure
L Low Pressure
Rain
Snow

By WeatherTec Services
Map valid for noon
December 21, 1993

December 21, 1877 marked the official beginning of winter in southern Manitoba, but conditions were not very winter-like. The snow had melted, and heavy rain fell from mid-December until Christmas Eve.

Winnipeg Area Forecast

Expect up to 4 cm of snow today. Brisk north winds will cause some blowing snow as temperatures fall.

TODAY.. Snow ending in the afternoon. Total accumulations up to 4 cm. Wind N 30 by noon. Windchill 1600. Turning colder in the afternoon. High -12. Low tonight -20.

WEDNESDAY.. Mainly sunny. High -15.

For the record — December 21

	Max	Min	Mean
Last year	-17.5	-23.1	-20.3
Normal	-10.0	-19.5	-14.8
Highest on record:			4.4 in 1899
Lowest on record:			-38.9 in 1884

Precipitation
Nov. 1 - Dec. 20
26.0 mm
81% of normal
Dec. 20 to 1 p.m.:
0.6

Manitoba Conditions Yesterday

	Max to 4 p.m.	Min	24-Hour Precipitation to 1 p.m.
Winnipeg	-16	-22	0.6
Churchill	-33	-37	nil
Thompson	-19	-28	0.3
The Pas	-13	-21	3.2
Dauphin	-5	-27	1.2
Brandon	-7	-23	0.5
Portage	-12	-22	nil
Kenora	-6	-18	1.4

Hot Spot: Swan River -4 **Cold Spot:** Churchill -37

National, International Temperatures

	Max.	Min.	Ottawa	1	-4	New York	5	0	Kiev	6	1	**RESORTS**		
CANADIAN			Montreal	1	-4	San Francisco	14	5	London	9	2	Honolulu	28	20
Victoria	7	1	Halifax	5	4	Seattle	6	1	Madrid	7	3	Las Vegas	12	0
Vancouver	8	0	U.S.			Washington	6	0	Manila	29	24	Los Angeles	21	8
Yellowknife	-28	-31	Atlanta	8	-1	WORLD			Mexico City	24	7	Miami	26	16
Whitehorse	0	-15	Boston	6	0	Amsterdam	9	3	Moscow	3	-2	Phoenix	17	4
Edmonton	-4	-8	Chicago	-1	-7	Athens	19	7	New Dehli	20	5	Tampa	21	9
Calgary	0	-8	Dallas	11	2	Beijing	0	-8	Paris	15	11	Acapulco	32	21
Saskatoon	-10	-21	Denver	-1	-15	Berlin	10	4	Rome	15	7	Barbados	29	25
Regina	-8	-21	Detroit	1	-4	Dublin	6	1	Sydney	24	19	Bermuda	22	18
Thunder Bay	-10	-17	Minneapolis	-4	-14	Hong Kong	24	17	Tokyo	9	3	Kingston	30	21
Toronto	2	-6	New Orleans	13	3	Jerusalem	17	10	Warsaw	10	2	Nassau	27	15

Extended Forecast

Southern Manitoba
30% chance of flurries Thursday. 40% chance Friday. Lows near -22. Highs -10 to -13. Normals: -21, -11.

Northern Manitoba
Mainly sunny Thursday. Cloudy with flurries Friday. Lows near -29. Highs near -17. Normals: -26, -17.

Northwestern Ontario
Some cloud Thursday. 40% chance of flurries Friday. Lows near -24. Highs near -12. Normals: -22, -11.

Information Source: Environment Canada

Excerpted from the *Winnipeg Free Press*, Dec. 21, 1993, and reprinted with permission from Weather Technical Services, Winnipeg, MB.

Tell the students that they are going to do an exercise in calculating with integers (positive and negative numbers), but they will need to know the locations of the major cities of Canada. Distribute to each pair of students a blank copy of a map of Canada, an atlas, and a list of the cities noted on the weather map. Instruct them to mark on their blank map, using the atlas as a guide, the approximate location of every city on the list as well as the names of all ten provinces and the territories.

[Imagery]
[Resourcing]

[Cooperation]

When they are finished, the pairs can combine into groups of four to check their maps against each other and make sure they have everything correct. They can also ask for help if they require it. [**Note:** We have treated this geography assignment rather casually here, assuming it will be a relatively straightforward task for these students. If they are unfamiliar with the geography of Canada, however, you may wish to develop this into an entire lesson that complements this mathematics lesson.]

[Self-evaluation]

[Cooperation]
[Questioning for clarification]

Now refer back to the "Today's Weather" handout, and ask a few questions about temperature differences. **Be sure to include examples of the different ways in which this concept can be expressed in English.**

- Where is Saskatoon? (Saskatchewan)
- According to the map, what will be today's high or maximum temperature in Saskatoon? (-10)
- What will be the maximum temperature in Winnipeg? (-12)
- These are **predictions**, aren't they? (yes) So we call them "predicted temperatures."
- **What will be the difference between** the predicted maximum temperatures in Saskatoon and Winnipeg? (-10 - (-12) = -10 + 12 = 2)
- You say 2; 2 what? (2°C)
- Where is Edmonton? (Alberta) Where is Thunder Bay? (Ontario)
- What will be the difference between the low (minimum) predicted temperatures in Edmonton and Thunder Bay? (-8 - (-17) = -8 + 17 = 9°C)

- Where is Montreal? (Quebec) Where is Regina? (Saskatchewan)
- Considering maximum temperatures only, which will be warmer, Montreal or Regina? (Montreal) **How much warmer**? (1 - (-8) = 9°C)
- When I asked, "How much warmer," what did you have to do? (subtract) So you were finding the difference? (yes) Good. Those are just two different ways of saying the same thing.

- Now look at Churchill, Manitoba on the map. What will be the high temperature there? (-28°C) What will be the low **overnight**? (-33°C) What does "overnight" mean? (during the night)
- **How much will the predicted temperature decrease** during the night? What does "decrease" mean? (go down, get lower) What is the opposite of "decrease"? ("increase") How will you find how much the temperature will decrease? (subtract)

- What do you get? (-28 - (-33) = -28 + 33 = 5°C)
- Yes, the predicted temperature will decrease 5°C overnight. When you are asked about a **decrease** in something, what do you have to do? (subtract)
- Look at the "Manitoba Conditions Yesterday" section. This section is **not** a prediction. It gives information about **actual** or **real** temperatures yesterday and last night. What was the high or maximum temperature yesterday in Thompson, Manitoba? (-19°C) What was the minimum or low in Thompson? (-28°C) How much did the temperature decrease overnight in Thompson? (-19 - (-28) = -19 + 28 = 9°C)

After a few more examples like this, proceed to the Practice phase. The students should now be prepared to answer questions like these in written form.

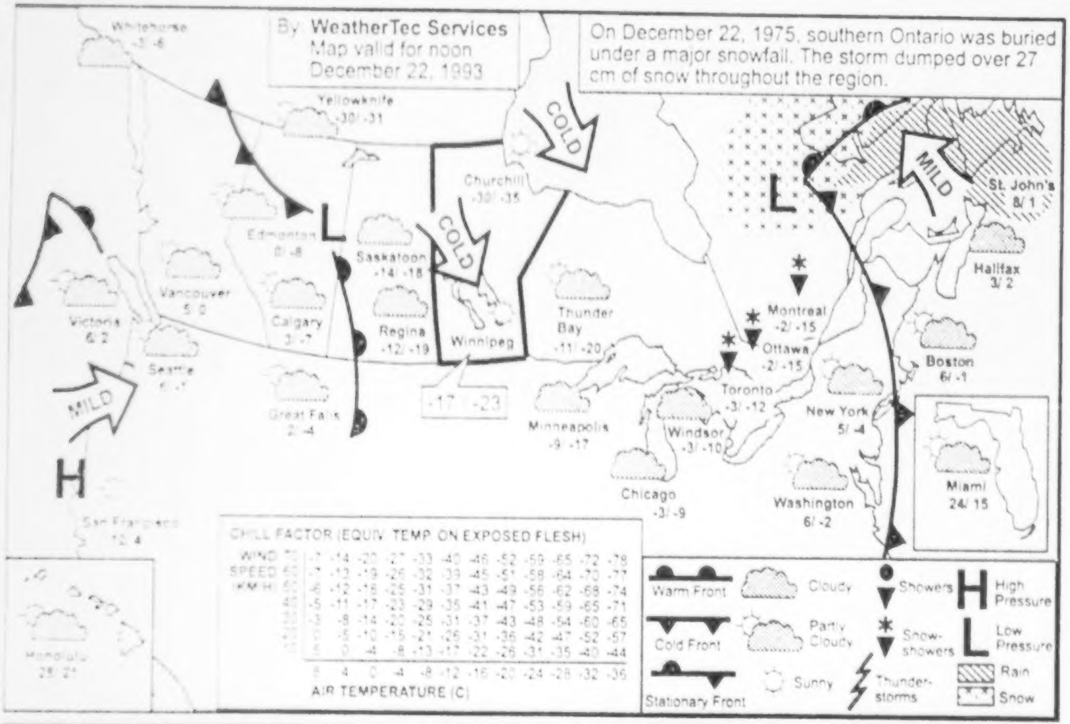
III. PRACTICE

Distribute a copy of another "Today's Weather" section. The report for Dec. 22, 1993, is given below as an example. Also distribute a math word problem worksheet similar to the one that follows. Allow the students to work in pairs to complete this worksheet. Circulate to assist them when requested. Advise them to look out for key words like "difference," "warmer/colder," and "decrease."

[Selective attention]	*[Imagery]*	*[Cooperation]*
[Self-monitoring]	*[Deduction/induction]*	*[Questioning for*
	[Transfer]	*[clarification]*

Today's Weather

C	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25
F	95	86	77	68	59	50	41	32	23	14	5	-4	-13


By: WeatherTec Services
Map valid for noon
December 22, 1993
On December 22, 1975, southern Ontario was buried under a major snowfall. The storm dumped over 27 cm of snow throughout the region.
Whitehorse -3/ -6
Yellowknife -30/ -31
Churchill -30/ -35
Edmonton 0/ -8
Saskatoon -14/ -18
Vancouver 5/ 0
Victoria 6/ 2
Calgary 3/ -7
Regina -12/ -19
Winnipeg
Seattle 6/ -1
Great Falls 2/ -4
-17 / -23
Thunder Bay -11/ -20
Minneapolis -9/ -17
Montreal -2/ -15
Ottawa -2/ -15
Toronto -3/ -12
Windsor -3/ -10
Chicago -3/ -9
New York 5/ -4
Washington 6/ -2
St. John's 8/ 1
Halifax 3/ 2
Boston 6/ -1
Miami 24/ 15
San Francisco 12/ 4
Honolulu 28/ 21
COLD
COLD
MILD
MILD
H
L
L
Warm Front
Cold Front
Stationary Front
Cloudy
Partly Cloudy
Sunny
Showers
Snow-showers
Thunderstorms
H High Pressure
L Low Pressure
Rain
Snow

CHILL FACTOR (EQUIV. TEMP. ON EXPOSED FLESH)

WIND SPEED (KM/H)												
70	-7	-14	-20	-27	-33	-40	-46	-52	-59	-65	-72	-78
60	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-70	-77
50	-6	-12	-18	-25	-31	-37	-43	-49	-56	-62	-68	-74
40	-5	-11	-17	-23	-29	-35	-41	-47	-53	-59	-65	-71
30	-3	-8	-14	-20	-25	-31	-37	-43	-48	-54	-60	-65
20	0	-5	-10	-15	-21	-26	-31	-36	-42	-47	-52	-57
10	4	0	-4	-8	-13	-17	-22	-26	-31	-35	-40	-44
AIR TEMPERATURE (C)	8	4	0	-4	-8	-12	-16	-20	-24	-28	-32	-36

Winnipeg Area Forecast

A high pressure system moving in from Alberta is bringing sunshine to the region today. However, a disturbance developing in the Yukon will bring cloud this evening. Temperatures will be very cold.

TODAY..Sunny conditions. Clouding over towards evening. High -17. Low tonight -23.

THURSDAY..Mainly sunny. High -17.

For the record — December 22

	Max	Min	Mean
Last year	-16.3	-22.5	-19.4
Normal	-10.2	-19.7	-14.9
Highest on record:	6.7 in 1877		
Lowest on record:	-41.7 in 1884		

Precipitation

Nov. 1 - Dec. 21
28.0 mm
82% of normal
Dec. 21 to 1 p.m.:
2.0

Manitoba Conditions Yesterday

	Max to 4 p.m.	Min	24-Hour Precipitation to 1 p.m.
Winnipeg	-10	-19	2.0
Churchill	-33	-35	0.2
Thompson	-19	-25	1.4
The Pas	-17	-21	2.2
Dauphin	-4	-17	1.4
Brandon	-5	-16	1.4
Portage	-9	-16	2.0
Kenora	-11	-15	0.2

Hot Spot: Dauphin -4 **Cold Spot:** Churchill -35

National, International Temperatures

	Max.	Min.
CANADIAN		
Victoria	6	2
Vancouver	5	0
Yellowknife	-30	-31
Whitehorse	-3	-6
Edmonton	0	-8
Calgary	3	-7
Saskatoon	-14	-18
Regina	-12	-19
Thunder Bay	-11	-20
Toronto	-3	-12
Ottawa	-2	-15
Montreal	-2	-15
Halifax	3	2
U.S.		
Atlanta	8	-1
Boston	6	-1
Chicago	-3	-9
Dallas	3	-6
Denver	-2	-11
Detroit	-1	-8
Minneapolis	-9	-17
New Orleans	9	4
New York	5	-4
San Francisco	12	4
Seattle	6	-1
Washington	6	-2
WORLD		
Amsterdam	5	0
Athens	20	13
Beijing	1	-9
Berlin	5	0
Dublin	6	-1
Hong Kong	22	16
Jerusalem	20	7
Kiev	2	-2
London	8	2
Madrid	8	4
Manila	29	24
Mexico City	24	8
Moscow	3	-3
New Dehli	21	6
Paris	13	4
Rome	18	11
Sydney	23	18
Tokyo	11	7
Warsaw	4	0
RESORTS		
Honolulu	28	21
Las Vegas	12	0
Los Angeles	24	11
Miami	24	15
Phoenix	18	4
Tampa	18	8
Acapulco	28	22
Barbados	29	23
Bermuda	24	20
Kingston	31	23
Nassau	26	20

Extended Forecast

Southern Manitoba
40% chance of flurries Friday. 30% chance Christmas Day.
Lows near -24. Highs -10 to -13. Normals: -21, -12.

Northern Manitoba
Flurries Friday. 40% chance of flurries Christmas Day.
Lows -28 to -30. Highs -17 to -20. Normals: -26, -17.

Northwestern Ontario
Mainly sunny Friday and Christmas Day.
Lows near -28. Highs near -16. Normals: -22, -11.

Information Source: Environment Canada

Excerpted from the *Winnipeg Free Press,* Dec. 22, 1993, and reprinted with permission from Weather Technical Services, Winnipeg, MB.

Temperature Worksheet

1. What will be the difference between today's predicted minimum temperatures in Montreal, Quebec and Saskatoon, Saskatchewan?

2. What will be the difference between today's predicted maximum temperatures in Regina, Saskatchewan and Toronto, Ontario?

3. What was the difference between yesterday's maximum temperatures in Brandon, Manitoba and Winnipeg?

4. Considering maximum temperatures only, which will be warmer today, Vancouver, British Columbia or Thunder Bay, Ontario? How much warmer will it be?

5. Considering minumum temperatures only, which will be colder tonight, Calgary, Alberta or Whitehorse, Yukon Territory? How much colder will it be?

6. Considering maximum temperatures only, how much colder will Churchill, Manitoba be than Acapulco, Mexico (a resort area)?

7. Considering minimum temperatures only, how much colder will Edmonton, Alberta, be than Ottawa, Ontario?

8. The chart for "Manitoba Conditions Yesterday" says that the maximum temperature in the Pas yesterday was -17°C, while the minimum overnight was -21°C. How much did the temperature decrease overnight in the Pas?

9. How much did the temperature decrease overnight in Portage, Manitoba?

10. By how much did the temperature drop overnight in Winnipeg?

11. Which city was warmer yesterday, Kenora, Ontario or Dauphin, Manitoba? How much warmer was it?

12. According to the "Winnipeg Area Forecast," what will be the high today and the low tonight in Winnipeg? How much will the temperature decrease overnight?

IV. EVALUATION

Take up the questions with the class, focusing on the mathematical operations only. Have the students volunteer their solutions, and write the correct calculations on the board or overhead. E.g.:

1. -15 - (-18) = -15 + 18 = 3°C
4. 5 - (-11) = 5 + 11 = 16°C

The students can correct their answers and ask questions about items they had difficulty with.

[Self-evaluation]

V. FOLLOW-UP

Show the students how their answers can be written in proper English sentences, using many of the words in the questions. E.g.:

1. What will be the difference between today's predicted minimum temperatures in Montreal, Quebec and Saskatoon, Saskatchewan? *3°C*

   The difference between today's predicted minimum temperatures in Montreal, Quebec and Saskatoon, Saskatchewan will be 3°C.

4. Considering maximum temperatures only, which will be warmer today, Vancouver, British Columbia or Thunder Bay, Ontario? How much warmer will it be? *16°C*

   Considering maximum temperatures only, Vancouver, British Columbia will be 16°C warmer today than Thunder Bay, Ontario.

Instruct them to complete the assignment by writing complete sentence answers for all the questions, and then edit these by working with partners.

[Self-evaluation] *[Elaboration]* *[Deduction/induction]* *[Cooperation]*

As a final step, have the students submit their full-sentence answers and correct them, working with the students individually to clear up any remaining difficulties.

[Self-evaluation] *[Deduction/induction]*

Extended Geography Activities:

1. Use the weather map to reinforce the students' knowledge of capital cities, provinces, and territories of Canada.

2. Introduce the legend on the map. Discuss each symbol and what it represents. Find these symbols as they occur on the map of Canada, and describe the weather conditions prevailing in those locations. Write about the weather conditions in the various capital cities.

3. Use the **Chill Factor** chart to determine the windchill equivalents of various combinations of temperature and wind speed. E.g.:

   If the air temperature is _____°C and the wind speed is _____ km/hr, the equivalent wind chill factor would be _________________.

(The authors would like to thank Linda McDowall for these suggestions.)

Lesson 15: Telephone Weather Forecasts - Science, Geography, Mathematics (T-List Procedure)

Objectives:

Content Objectives:

- To reinforce, and elaborate upon, the students' prior knowledge about weather by listening to a weather recording from Environment Canada for one week
- To practise distinguishing between main and subordinate ideas by using a T-list to take notes
- To transfer notes from a T-list to a chart
- To graph all the information from the chart

Language Objectives:

Skills:

- Listening - in group discussions; while taking notes from a telephone recording
- Speaking - in group discussions; while comparing and correcting answers
- Reading - of notes, when transforming them to a chart and a graph
- Writing - taking notes on a T-list; transferring information from a T-list to a chart to a graph

Linguistic Knowledge:

Vocabulary Development:

Environment Canada Weather Information Service, sky condition, sky cover, overcast, cloudy, partly cloudy, clear, high, low, temperature, wind, direction, kilometres per hour, relative humidity, percent, barometric pressure, unit of force, kilopascal, rising, steady, falling, tendency, forecast, windchill, watt, square metre, chart, graph, fraction, cooling rate, given area, frostbite, freeze, precaution, valid, average, appropriately, inappropriately, source, category, daily, a.m., p.m.

Structures:

- Comparative and superlative forms of adjectives
- Modal verb *could* to express future possibility, e.g., "We could get frostbite"
- Passive voice in WH-questions, e.g., "how is snowfall measured?"
- Future progressive tense, e.g., "What details will you be listening for?"
- Prepositions - *at* with times of day (e.g., "at 1:00 p.m."), *within* (e.g., "within minutes"), etc.
- Compound noun structures, e.g., "Environment Canada Weather Information Service"

Discourse Features:

- Sequence markers *first, second, third, ... , last*
- Date format, e.g., "09/01/95"

Functions:

- Classifying
- Hypothesizing - e.g., "We could get frostbite"

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Selective attention, Organizational planning, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Resourcing - using newspapers, television, radio, and the telephone to obtain weather information
- Grouping - information about weather
- Note taking - from a telephone recording to complete a T-list
- Summarizing - information from the recording on a T-list and a chart
- Imagery - making charts and graphical representations
- Auditory representation - while taking notes
- Elaboration - expanding weather information from a T-list to a chart to a graph
- Transfer - of prior knowledge about weather to new tasks
- Inferencing - guessing while taking notes
- Deduction/induction - when discussing language forms, e.g., comparative and superlative forms of adjectives (*colder, coldest, faster, fastest,* etc.)

Social-Affective Strategies:

- Cooperation, Questioning for clarification

Materials:

- A telephone, preferably one with a speaker
- Two Environment Canada Weather Information Service T-lists, one detailed and one "reduced" (see next two pages)
- Chart for recording weather information (see end of lesson)
- Graph paper

Note: The following T-lists have been constructed to follow the usual order of information given in Winnipeg area Environment Canada Weather Information weather reports, available by telephoning 983-2050. This order may change in future, and in any event needs to be adjusted to suit the particular season; the T-lists below are appropriate for the winter months. Teachers using this lesson are advised to access their local telephone weather service themselves, record the weather report and forecast, and use this information as the basis for constructing T-lists appropriate to their own individual settings.

Detailed T-list

ENVIRONMENT CANADA WEATHER INFORMATION SERVICE (983-2050)

(Date) ________________ at (Time) ________________ (a.m./p.m) _______

A. Current Weather Conditions	
1. Sky conditions	Winnipeg: ____________________________
2. Precipitation (if any)	________________________
3. Temperature	_______ °C Windchill _________ watts/m^2
4. Wind	a. direction __________________________
	b. ____________________ km/hr
5. Relative humidity	______________ %
6. Barometric pressure	a. ____________ kilopascals
	b. and _________________ (rising or falling?)
B. Forecast	
1. Temperature	high _____ °C, low _____ °C
2. Windchill	_____________ watts/m^2
3. Precipitation (if any)	___________________________

Reduced T-list

ENVIRONMENT CANADA WEATHER INFORMATION SERVICE (983-2050)

________ at ________ ______

A. Current Weather Conditions	
1. ________ conditions	Winnipeg: ________
2. ________ (if any)	________
3. ________	______ °C ________
4. ________	a. dir. ________
	b. ________
5. ________	________ %
6. ________	a. ________ kilopascals
	b. and ________
B. Forecast	
1. ________	high ______, low ______
2. ________	________
3. ________	________

Also note that the first T-list, the detailed version, should be used the first few times the students record the weather report on the telephone. After they have learned the categories, they can be given the "reduced" version instead, which requires them to fill in more information on their own.

Procedures:

Note: This lesson employs a variant of the **T-list Procedure** described in Chapter 3 and previously used in Lessons 5 and 7 of this unit. Refer to those lessons for details about the application of this Foresee technique.

I. PREPARATION

Note: The Preparation stage should be conducted on a **Friday**, in order to allow the entire following week for the note taking activity in the Practice phase.

Ask the class where they could obtain a weather forecast for the coming Monday. They should be able to name at least four sources: television, radio, newspaper, and the telephone. Ask:

- What do you think would be important to know about Monday's weather? (temperature, whether it will be cloudy or clear, wind direction and speed, precipitation, windchill)
- Why do you think it is important to know these for Monday? (We could plan how to dress for the cold appropriately, especially if we are going to be outdoors for a while.)
- Why is this important? (We could get frostbite or freeze within minutes if dressed inappropriately.)

Note: At this point explain how people can freeze if stranded in a snowstorm. Also discuss precautions one can take on foot or in a car to prevent this.

Instruct assigned students to obtain the Monday weather forecast on Sunday, in preparation for Monday's class. They are to find:

1. Temperature - high and low
2. Sky conditions
3. Wind - direction and speed in km/hr
4. Precipitation
5. Windchill

Assign each student one particular source to consult:

1. Radio
2. Television - Channel 9
3. Newspaper - weather report in the classified section; also "The Weather" on the front page
4. Telephone - 983-2050

The above sources are for Winnipeg, Manitoba. In other cities, contact your local weather office for information about television channels, telephone numbers, etc.

[Advance organization]
[Selective attention]
[Organizational planning]
[Elaboration]
[Note taking]
[Resourcing]

II. PRESENTATION

Discuss the forecasts the students obtained from the various sources. Focus on the key words which are in their forecasts and how they relate to what they already know about the water cycle, clouds, precipitation, wind, etc.

Strategy Instruction:

[Resourcing]--

Ask:

- Which was the best source of information? (the telephone)
- Why? (It gave most of the information we wanted.)
- If we record the weather conditions for one week, which source would be the easiest to use and also give all the information we need? (the telephone)
- How was the information given on the telephone? (from a recording)
- What is a recording?
- Why do you think a recording is used?
- When we use resources like the telephone, the newspaper, television, or the radio to obtain extra information, what strategy are we using on the green sheet? (Resourcing)

[Advance organization]--
[Organizational planning]--
[Selective attention]--

- What do you think we should listen for? (The students will give varied replies, depending on the information they included in their forecasts.)
- What are the key words we should be listening for? (temperature, weather conditions, wind, precipitation, snow, windchill, etc.)

List the important criteria on the chalkboard or overhead, and then distribute the "Environment Canada Weather Information Service T-list" (detailed version). Discuss how to complete it, using abbreviations when taking notes from the telephone recording they will hear and filling in information as instructed below.

Strategy Instruction:

[Organizational planning]--
[Selective attention]--

Ask:

- What will we write at the top, in the first blank? (the date)
- What should we write? (the day, month, and year)
- How could we write this? (e.g., 09/01/95)
- What should we write after "at"? (the time)
- Why? (because we have to get the current weather conditions at the same time each day in order for a comparison to be valid)

- Let's look at the main ideas. Which column are they in? (first column) How do you know? (same as other T-lists)
- What are the two main ideas? (A. Current Weather Conditions, and B. Forecast)
- What are the main ideas under the "Current Weather Conditions"? (first, sky conditions; second, precipitation; third, temperature; fourth, wind; fifth, relative humidity; sixth, barometric pressure)

- What are sky conditions? (sky coverings)
- What are the words or details used by Environment Canada to describe sky conditions? (overcast, cloudy, partly cloudy, clear)

Explain to the students what these terms mean, in terms of what fraction of the sky is covered with clouds.

- overcast — 10/10 of the sky is covered with clouds
- cloudy — 6/10 to 9/10 is covered
- partly cloudy — 1/10 to 5/10 is covered
- clear — 0/10 is covered

- In the second category, what is precipitation? (snow, rain, etc.) What kind of precipitation falls at this time of year? (snow)
- How is snowfall measured? (usually in cm)
- Will the weather report always tell how much snow has fallen? (no) That's right. Sometimes it will just tell you if it is snowing outside. If it isn't snowing, it may say nothing at all.

- In the third category, how are temperatures measured? (in degrees Celsius, written °C)
- What does windchill tell us? (how cold it really feels) Yes. We'll talk more about windchill under "Forecast."

- In the fourth category, what details will you be listening for under "wind"? (direction and speed)
- How will the direction be described? (north, south, east, or west, written N, S, E, or W) [Note: You may also choose to discuss terms like northeast (NE), north-northeast (NNE), and so forth.]
- How will the speed of the wind be measured? (in kilometres per hour, written km/hr)
- What detail will you be listening for? (a number)

- In the next category, how will the relative humidity be measured? (in percent, written %)
- What detail will you be listening for here? (a number)

- In the sixth category, what is barometric pressure? (the pressure of the air) Do you remember doing an experiment to study changes in the air pressure? (yes) What is the name of the instrument that measures air pressure? (barometer)
- What units are used to describe air pressure or barometric pressure? (kilopascals)
- What detail will you be listening for? (a number)
- Does this number remain constant throughout the day? (no)
- What does it do? (It rises, remains steady, or falls.)

- What is the main idea in category B? (the forecast)
- What is a forecast? (a prediction of the weather)
- What main ideas will you be listening for? (the temperature, windchill, and precipitation that are predicted)

- What details will you be listening for under "Temperature"? (the high and low)
- What are they? What do those words mean? (The high is the warmest temperature during that day, and the low is the coldest temperature)

- What is the second important thing in the forecast? (windchill)
- What is the windchill? (the cooling rate, or how much heat your body loses)
- What does the windchill depend upon? (the temperature and the speed of the wind)
- How is windchill measured? (watts per square metre, written watts/m^2)
- What detail will we be listening for here? (a number)

- What is the third important thing in the forecast? (precipitation) What will you be listening for here? (whether it is going to snow, and how much)
- If the forecast tells you how much, how will it be measured? (in cm) Will you write the number of cm down? (yes)

- Do you think the weather forecast might include some other information? (sometimes)
- What else? (sky conditions, wind)
- We won't bother with these under the forecast. You will already have noted them under current conditions.

- Will this T-list help you when you are note taking? (yes)
- Why? (We won't have time to write too much, as we are listening to a recording.)

[Organizational planning]
[Selective attention]

III. PRACTICE

Have the students telephone Environment Canada Weather Information Service at 983-2050 (in Winnipeg). Press *hands free* or *speaker* so all the students can hear and take notes from the tape recording. **Do not** press any selection buttons, as requested at the beginning of the recording. The T-list follows the order of information given after these initial selection choices.

The students will have to telephone this number several times to obtain all the information necessary to complete their T-lists.

After the students have gained experience in using the detailed T-list on a number of consecutive days, make the task more challenging for them by instructing them to use the "reduced" T-list.

[Selective attention]
[Self-monitoring]

[Note taking]
[Auditory representation]
[Inferencing]
[Grouping]
[Resourcing]
[Summarizing]

IV. EVALUATION

The students are assigned to groups, where they compare and pool the information on their T-lists. Then, using an overhead transparency, demonstrate how to transfer the information from their T-lists to their charts (see the end of this lesson for a sample chart). Have the students contribute the necessary information while you model how to fill in the chart.

[Self-evaluation]

[Imagery]
[Grouping]
[Transfer]
[Elaboration]
[Summarizing]

[Cooperation]
[Questioning for clarification]

V. FOLLOW-UP

At the end of the week or the following week, the students can draw line graphs of some of the information on their charts (e.g., temperatures, precipitation in cm, relative humidity, barometric pressure). They can find the average for each graph and write a sentence below the graph to summarize this. E.g.:

> The average daily temperature for the week of January __ to __ was -16°C.
> The average daily precipitation for the week of January __ to __ was 2.4 cm.

The various graphs can be glued to a large piece of construction paper and displayed in the classroom.

Comparatives and superlatives could be integrated into this part of the lesson, as the graphs will quickly indicate which day was the "coldest," on which day the wind was the "strongest," on which day the relative humidity was the "highest" or "lowest," etc.

[Self-evaluation]

[Grouping]
[Transfer]
[Elaboration]
[Summarizing]
[Imagery]
[Deduction/induction]

WEATHER CONDITIONS: ____________ to ____________, 19___

Time and Date	Sky Conditions	Precipitation	Temperature	Wind	Relative Humidity	Barometric Pressure
________ ________	________	________	______°C Windchill: ______ watts/m²	Direction: ________ Speed: ________	______%	____kilopascals and ________

Lesson 16: Weather Haiku - Language Arts

__Objectives:__

Content Objectives:

- To utilize the academic language about weather studied in this unit in a creative form
- To learn how to write haiku, short poems in a Japanese verse form

Language Objectives:

Skills:

- Listening - in class discussions; to themselves and each other as they are creating their haiku verses
- Speaking - in class discussions; to themselves and each other as they are creating their haiku verses
- Reading - haiku verses; notes and summaries
- Writing - haiku verses

Linguistic Knowledge:

Vocabulary Development:

haiku, verse, poem, pattern, lines, indent, beats, syllables, contain, nature, origin, originate, lead to; all previous vocabulary associated with weather

Structures:

- Capitalization of first word of each line of poetry
- Punctuation - using periods and commas at the end of lines in poems; using commas in lists of items
- Present participle forms of verbs (e.g., *floating, falling*)
- Syllabic structure of English words

Discourse Features:

- Haiku verse form

Functions:

- Describing
- Defining (of haiku verse form)

Learning Strategies:

Metacognitive Strategies:

- Advance organization, Organizational planning, Selective attention, Self-monitoring, Self-evaluation

Cognitive Strategies:

- Resourcing - using cycles, summaries, charts, etc.
- Summarizing - condensing ideas into a haiku verse form
- Deduction/induction - deciding on correct forms when writing haiku verses
- Auditory representation - when sounding out beats or syllables for haiku verses
- Elaboration - using prior knowledge of the academic language associated with weather to write their haiku verses
- Transfer - of their factual knowledge of weather to the creative composition of haiku verse

Social-Affective Strategies:

- Questioning for clarification, Cooperation, Self-talk

Materials:

- Summaries, T-lists, cycle diagrams, charts, pictures, graphs, etc. used in this unit
- Sample haiku verses about weather

Procedures:

I. PREPARATION - Listening and Speaking

Review the academic language associated with weather by referring to the students' summaries from the weather presentations (Lesson 13), their T-lists (Lessons 5 and 7), their cycle diagrams (Lessons 4 and 9), etc.

Show a haiku verse on the overhead transparency or the chalkboard. E.g.:

Clouds

Clouds floating above,
Cirrus, stratus, cumulus,
Signal the weather.

[Advance organization]

Ask:

- What is this? (a verse, a poem)
- It is a special type of verse. Do you know the name for it? (haiku)

- Where did the haiku verse form come from? (Japan)
- Yes, the form was first used in Japan — it began there. Another word for this is "originate," which means to begin or be made for the first time. What is the root word of "originate"? (origin) Good. What does "origin" mean? (beginning)
- What kind of word is "originate"? (a verb) What kind of word is "origin"? (a noun) So how do we get the verb "originate" from the noun? (add "ate" to the noun "origin")
- Good. Do you know where pizzas originated? (Italy) How about sumo wrestling? (Japan)
- Yes, and as I said, haiku verse also originated in Japan.

- What is this haiku verse about? (clouds)
- What are clouds a part of? (weather)
- What is weather a part of? (nature)
- Most haiku verses are written about nature. Now let's look at this verse carefully; it follows a special **pattern**, as you will see. Do you know the word "pattern"? (no) It means the way something is made up. For example, the tiles on the floor have a special pattern; can we draw it? [Illustrate] How about ___________'s shirt? Does it have a pattern? (yes)
- Now let's figure out the pattern of this poem. First, how many lines does it have? (three) Yes. In fact, haiku verses all have three lines; it's part of the pattern.
- Which line is the longest? (the second line)
- Look at the length of the first and third lines. Do they start at the same place as the second line does? (no)
- Where do they start? (over to the right, a little bit)
- When you were writing your descriptive paragraphs on clouds or precipitation, what did you do to the first line in each paragraph? (indent)
- What does "indent" mean? (to leave a space)
- Did I leave a space in lines 1 and 3? (yes) Could we say I indented lines 1 and 3? (yes)
- Yes, in haiku verse we usually indent the first and third lines, because they are shorter than the second line.

- Now listen to me carefully as I read the verse aloud. [Read the verse orally, clapping your hands with each syllable.] When I say the verse like this, what do you hear? (beats)
- What are these beats called? (syllables)
- Good. Let's try it again, but this time we will count the beats or syllables in each line. Here's the first line: Clouds float ing a bove. [Say this a few times, clapping your hands.] How many syllables are there? (five)
- Good. Let's try the second line: Cir rus, stra tus, cum u lus. How many syllables are there in this line? (seven)
- Now let's do the third line: Sig nal the wea ther. How many syllables? (five)

- Good. Now let's look at the capitalization and punctuation here. What does each line start with? (a capital letter) And what does the haiku end with? (a period)
- Are there any other punctuation marks here? (yes, commas at the end of lines 1 and 2) That's right, but it isn't always necessary to put those in; some haiku verses don't

contain commas, and others use different punctuation marks like semicolons and hyphens. We won't worry too much about those commas.

- The important things to remember are that each line begins with a capital letter, and the haiku ends with a period.

- Now let's describe the pattern of a haiku, including everything we have discovered. What is a haiku? (A haiku is a verse about nature that contains three lines, with the first and third lines indented. The first line contains five syllables, the second line contains seven syllables, and the third line contains five syllables. Each line begins with a capital letter and the verse ends with a period.)

[Advance organization]
[Organizational planning]
[Elaboration]
[Resourcing]
[Self-talk]

II. PRESENTATION - Listening and speaking

Put another haiku verse on the overhead or chalkboard. Tell the students to read it and to check if it follows the haiku verse form pattern. E.g.:

The Water Cycle

Evaporation
Leads to condensation, then
Precipitation.

Ask:

- Does it follow the haiku verse form pattern? (yes)
- How? Give me details. [Go through the verse together, clapping hands to help determine the number of syllables in each line.]
  - It's about nature — the water cycle.
  - There are 3 lines.
  - The first and third lines are indented.
  - Line 1 has 5 syllables, line 2 has 7 syllables, line 3 has 5 syllables.
  - Each line begins with a capital letter.
  - The verse ends with a period.

Strategy Instruction:

[Resourcing]--

- Where did I get the words for this haiku? (from the water cycle diagram)
- What words did I use from that diagram? (the water cycle, evaporation, condensation, precipitation)
- How many words are in the haiku, including the title? Count them. (nine)
- How many words came from our water cycle diagram? (six)
- Do you think the water cycle diagram was a good resource to help me write my haiku? (yes)
- Why? (It gave you most of the words you needed to write your haiku.)

- What do you think I used when I wrote the "Clouds" haiku? (the clouds T-list)
- Look at the clouds haiku again. How many words does it contain, including the title? (ten)
- How many of those words came from the clouds T-list? (six)
- Do you think the clouds T-list was a good resource to help me when I was writing this haiku? (yes)
- Let's write a haiku verse together on **precipitation**. What should we use to help us think of words? (our precipitation T-lists) Yes, take those out. [The students take out their T-lists from Lesson 7 and use them as a reference.]

[Organizational planning]-- *[Deduction/induction]--*

- What should we write for the title? ("Precipitation")
- Should we begin this word with a capital letter? (yes) Why? (title)
- According to the T-list, what is one important fact about precipitation? (There are five types.)
- What are they? (drizzle, rain, sleet, snow, hail)
- Do you think we should use these words in our haiku? (yes)
- What line do you think these words would fit in best? (the second line)
- Why? (a lot of words, too many syllables for the first or the last lines)
- How many syllables are there in these five words? [Clap hands.] (six)
- How many syllables do we need for the second line? (seven)
- What word could we add to this list? It must contain only one syllable. ("and")
- What would our second line be then? ("Drizzle, rain, sleet, snow, and hail")
- What do you have to remember to put between the forms of precipitation as you list them? (commas)

- Now, what could we write about all of these forms of precipitation? (They are formed in clouds.)
- Let's look at your T-lists on precipitation. Are all these types of precipitation formed in clouds? (yes)
- How could we write where they are formed, using 5 syllables or beats? ("Always formed in clouds")
- Should this be our first line or our last line? (first)
- Why? (It tells us where precipitation is formed.)
- What should we start the line with? (capital "A")
- Do you think we should put a comma after "clouds"? (yes)
- OK, so far we have:

Precipitation

Always formed in clouds,
Drizzle, rain, sleet, snow, and hail

- Now we have to make up the last line. What information should we use? Where does precipitation fall? (to the ground)
- Should we write that? (yes)
- How can we write that it falls to the ground, in 5 syllables? ("Falling to the ground")

- What else do we need, at the end? (a period)
- Good. So here's what we have:

Precipitation

Always formed in clouds,
Drizzle, rain, sleet, snow, and hail
Falling to the ground.

- What about a punctuation mark after "hail"? Do we need one? (no)
- Why not? (The forms of precipitation are like the subject of "falling." We don't need a comma between the subject and the verb.)
- Does this verse follow the haiku pattern? (yes)
- Explain.
    - about nature (precipitation)
    - 3 lines
    - lines 1 and 2 indented
    - Line 1 has 5 syllables.
    - Line 2 has 7 syllables.
    - Line 3 has 5 syllables.
    - period at the end

- How many words are there in the haiku, including the title? (15)
- How many words came from out T-list? (11)

[Advance organization]
[Organizational planning]
[Selective attention]

[Resourcing]
[Summarizing]
[Deduction/induction]
[Auditory representation]
[Elaboration]
[Transfer]

[Self-talk]

III, IV. PRACTICE AND EVALUATION - Reading and Writing

Instruct the students to try writing their own haiku using their cycle diagrams, T-lists, summaries, and other resources they have accumulated in this unit to help them find words to create their verses. Tell them to select any weather condition in nature and follow the standard haiku pattern when they compose their verses.

The students then write their haiku verses. They edit them with a partner or the teacher, counting out the syllables in each line as they recite them.

[Selective attention]
[Self-monitoring]
[Self-evaluation]

[Resourcing]
[Deduction/induction]
[Summarizing]
[Auditory representation]
[Elaboration]
[Transfer]

[Cooperation]
[Questioning for clarification]
[Self-talk]

V. FOLLOW-UP - Reading

The students read their haiku verses to the class. Their verses can be illustrated and displayed on the bulletin board, if desired.

[Self-evaluation] *[Cooperation]*

Extended Activity:

The students elaborate upon their haiku verse knowledge and follow the same process to write another oriental verse form, a **tanka**. A tanka is similar to a haiku except that it has two more lines. A tanka consists of:

- Line 1 — 5 syllables
- Line 2 — 7 syllables
- Line 3 — 5 syllables
- Line 4 — 7 syllables
- Line 5 — 7 syllables

[Elaboration]
[Transfer]

(The authors would like to thank Doreen Jaremy for suggesting this extended activity to us.)

LEARNING LOG FOR LESSONS 12-16

VOCABULARY I KNOW:

Weather Nouns

___ effects
___ environment
___ high
___ low
___ overnight
___ sky condition
___ overcast
___ sky cover
___ temperature
___ direction
___ unit
___ force
___ kilopascals
___ tendency
___ windchill
___ watts
___ rate
___ frostbite
___ precautions

Geography Nouns

___ countries
___ continents
___ zones
___ hemisphere
___ location
___ map
___ atlas
___ province
___ territory

Mathematics Terms

___ positive
___ negative
___ sign
___ minus
___ number line
___ horizontal
___ vertical
___ subtract
___ difference
___ add
___ sum
___ whole number
___ integer
___ maximum
___ minimum
___ decrease
___ increase
___ prediction
___ percent
___ square metre
___ graph
___ fraction
___ area
___ valid
___ average

Miscellaneous Nouns

___ resources
___ filmstrips
___ reference materials
___ encyclopedias
___ dictionaries
___ description
___ category
___ elaboration
___ chart
___ nature
___ origin

Academic English Terms

___ research
___ report
___ reference
___ summary
___ haiku
___ verse
___ poem
___ pattern
___ lines
___ beats
___ syllables

Weather Verbs

___ cause
___ occur
___ predict
___ rise
___ fall
___ freeze

Miscellaneous Verbs

___ describe
___ summarize
___ categorize
___ elaborate
___ expand upon
___ recall
___ consider
___ contain
___ originate

Adjectives

___ interesting
___ extra
___ specific
___ particular
___ prior
___ previous
___ rising
___ falling
___ steady

Adverbs

___ respectively
___ temporarily
___ partly

Discourse Markers

___ as follows
___ such as
___ while
___ considering

CONTENT

I can:

____ use the library to find resources for a research report
____ do research on a weather topic
____ gather information about a weather system
____ present a project to the class
____ explain a variety of weather systems
____ use an outline to summarize information
____ add and subtract positive and negative integers
____ complete a set of math word problems on temperature differences
____ find information on a newspaper weather report
____ identify and name the major cities in Canada
____ obtain information about weather from a telephone weather recording
____ transfer information from a T-list to a chart
____ graph information about weather
____ use weather terms to write haiku

LANGUAGE

I can:

____ write a research report
____ write complete and correct sentences from an outline
____ write my answers to math word problems in complete sentences
____ form paragraphs from an outline
____ capitalize proper nouns
____ use commas to list items
____ combine sentences using conjunctions
____ combine sentences using clauses
____ use pronouns to take the place of nouns
____ use descriptive adjectives to describe weather
____ summarize information in point form, using a chart
____ write haiku verse forms
____ count out beats or syllables

LEARNING STRATEGIES

Using metacognitive strategies (those on the blue sheet), I can:

____ look at pictures, headings, and subheadings to get an idea about a reading passage before I read it
____ select key words to help me focus and learn new tasks
____ plan how to complete a task before I do it
____ monitor and check how I am doing during the task
____ evaluate how well I have done a task after I have completed it

Using cognitive strategies (those on the green sheet), I can:

____ use library resources to obtain more information

___ choose resources with good pictures and diagrams to help me understand
___ use resources like the newspaper, television, radio, and the telephone to obtain information
___ use previous resources such as cycles, T-lists, summaries, and charts in a creative way to write a haiku Japanese verse form
___ take notes from a reading activity
___ take notes during oral presentations
___ take notes from a telephone recording
___ elaborate upon my prior knowledge about weather to do a research report and a presentation
___ elaborate upon my prior knowledge about temperatures to complete math word problems
___ group information on a research outline as I am reading
___ group information under appropriate headings during an oral presentation
___ use inferencing as I fill in the missing parts of a research outline, a summary, and a T-list
___ elaborate my notes to complete sentences and paragraphs in a formal research report
___ transfer information about my research project to the summaries of other people's projects
___ transfer my math skills on subtracting integers to a geography activity
___ transfer factual knowledge to the creative form of haiku verse
___ summarize information in point form, using a T-list or chart
___ use pictures, diagrams, maps, charts, and graphs to help me understand new information

Using social-affective strategies (those on the pink sheet), I can:

___ ask questions to help me and others to learn
___ cooperate with others to learn
___ use self-talk to help me work through an activity

Chapter 5

Applying the Foresee Approach in Secondary Mainstream Classrooms

Chapter 5

Applying the Foresee Approach in Secondary Mainstream Classrooms

1. Introduction

As we have emphasized a number of times in the course of this manual, the weather unit described in the previous chapter represents an example of Foresee application appropriate for secondary level instruction in a "pure-ESL" classroom setting. That unit aims, above all, to promote students' academic language development and skill in using effective learning strategies. Though it certainly does not dismiss content-area knowledge and skills as irrelevant, it treats the subject matter primarily as a means to other ends that happen to be of greater immediate importance to ESL students on the threshold of participating in mainstream classrooms on an equal footing with their English-speaking peers. Furthermore, the procedures used to accomplish these special instructional goals, as illustrated throughout the unit, are well suited to the needs and linguistic competence of ESL students. As each individual lesson demonstrates, Foresee is a slow and patient approach that allows teachers to take their time in building their students' English proficiency and ability to cope with new learning tasks autonomously and effectively. Foresee may take time, but it provides teachers with a surefire way to bolster their students' self-confidence by setting them up for success.

In this chapter, we turn our attention from the ESL classroom to the regular subject-area classroom. We are convinced that at the secondary level, Foresee units like the one in the previous chapter would not be wholly suitable for mainstream classes containing a mixture of ESL and English-speaking students. Putting this another way, the Foresee Approach could not realistically be applied *in its entirety* in a regular classroom context. There are at least four good reasons for this.

(1) Student Needs and Interests. At the elementary level, Foresee can usually be applied effectively in its total form (with minimal adjustments) in regular classrooms, since many of the academic language skills and learning strategies that younger English-speaking children need to learn are much the same as those required by ESL students. Also, most younger children, regardless of language background, tend to respond well to the kinds of techniques used in ESL-oriented Foresee lessons. The situation is undoubtedly different at the secondary level, however. Cognitively mature English-speaking students at the secondary level — especially the senior high level — do not require language instruction of the same kind as ESL students do, and by this point in their schooling most have acquired their own personal repertoires of learning strategies that "work for them." These students would almost surely fail to respond positively to slow and patient language-building and strategy-building instructional procedures of the sort recommended in our Foresee weather unit. Academically above-average and even average students would probably be quite bored by Foresee instruction, and we caution emphatically against using our approach, at least in its complete form, with students of this calibre. On the other hand, we suggest that English-speaking students with weak academic language skills and poor study habits might benefit enormously from some form of modified Foresee instruction.

(2) Teachers' expertise and responsibilities. Many secondary teachers are subject-area specialists who have acquired extensive knowledge about their own particular fields as well as great expertise in teaching the regular curriculum within those fields, and they view their primary responsibility to be the teaching of this curriculum. These teachers should not be expected to have a formal background in linguistics or second language acquisition theory, and therefore would probably have some significant problems in applying the Foresee Approach. Foresee demands a certain minimal level of linguistic understanding for total implementation, particularly for establishing academic language objectives and devising procedures for teaching these. Although ESL teachers should certainly be expected to possess adequate knowledge about structures, discourse features, academic language functions, and so forth, teachers of mainstream subjects cannot be assumed to know enough about these aspects of language to be able to apply Foresee easily and effectively. Furthermore, mainstream teachers have a great deal to do in any event, and few would have the time and energy required to learn the Foresee Approach in its entirety, i.e., as depicted in the first four chapters of this manual.

(3) Time. Secondary teachers of regular subject areas generally feel that they are under a good deal of pressure to cover the curriculum. Few, if any, would have the extra class time needed to implement Foresee in the total form illustrated in Chapter 4.

(4) Inappropriateness of an integrated thematic approach. As demonstrated in our weather unit, Foresee unit development normally involves a thematic approach integrating a number of different subject areas — science, social studies, language arts, mathematics, etc.

Units of this sort are ideal for regular classrooms at the elementary level, where each class of students ordinarily learns the greater part of the curriculum from the same teacher. Such integrated instruction would not be practical, however, in most subject-focused classrooms at the secondary level, for obvious reasons.

For a number of convincing reasons, then, it appears that the "complete" Foresee model is not well-suited to regular subject-area instruction in the typical secondary classroom, even one containing a large proportion of ESL students. This does not imply, however, that Foresee has no potential for use at the secondary level except in the ESL classroom. We would argue that a number of aspects of the Foresee theoretical model and the Foresee application process, including many individual Foresee techniques and procedures, are potentially adaptable to secondary instruction in the regular classroom, and the use of these could conceivably benefit many English-speaking students as well as their ESL classmates. The purpose of the remainder of this chapter is to suggest some aspects of the overall Foresee model that mainstream teachers could use to enrich their instructional repertoires, not only as a means of assisting their ESL students, but also to meet the academic needs of some of their English-speaking students.

Needless to say, ESL teachers must bear much of the responsibility for informing their mainstream colleagues about Foresee and encouraging the implementation of Foresee procedures in regular classrooms. ESL teachers will obviously be the first to master our approach, and they should certainly be the ones with the linguistic expertise required to implement it, whether in whole or in part. They should therefore begin to regard collaboration with regular subject-area teachers as an important part of their job (see Section 4 in Chapter 1). **COLLABORATION IS CRUCIAL!** Instructional support for ESL students must be spread across the curriculum, not confined to isolated ESL classrooms that serve as "incubators" from which students are expected to emerge fully prepared for mainstream work.

If ESL support teachers are unavailable to provide this kind of assistance, as in some secondary schools which have adopted a "mainstreaming" or immersion model for accommodating their ESL students, this kind of collaboration will naturally be impossible. In this case, it will be up to individual classroom teachers to learn about Foresee on their own. The great disadvantage of mainstreaming is that most regular subject-area teachers lack extensive knowledge of ways in which they might modify their instruction to meet the special needs of ESL students. We are confident that the Foresee Approach is a coherent model of integrated instruction with the potential for adaptability to the regular classroom setting, and we hope that the suggestions and ideas on the following pages will prove accessible and useful to teachers in secondary schools employing a mainstreaming policy.

One final point. The suggestions below generally presume a certain minimal knowledge of the fundamental principles and procedures of the Foresee Approach. The reader need not have read all of Chapter 4 to make sense of most of them, but some familiarity with the ideas in Chapters 1-3 will be necessary for full understanding. Our purpose here is not to explain Foresee, as we have fulfilled this task in the earlier part of this manual. What we wish to do here is to pick and choose among the various features of our model, selecting a number of aspects that might be of value to secondary teachers in regular classrooms.

The features of Foresee that we recommend as feasible supplements to regular classroom instruction fall into two main categories. On one level, Foresee offers a straightforward guide to achieving multiple objectives through the teaching of content-area material. This possibility is explored in Section 2 below. On another level, Foresee methodology contains a range of alternatives for modifying teaching procedures to meet the special needs of ESL students. While our approach may not be applicable *in its complete form* within secondary mainstream classrooms, as admitted above, it can nevertheless serve as a rich source of teaching techniques and activities that can be selected and applied on an individual basis. We offer some suggestions for such techniques and activities in Sections 3, 4, and 5.

2. Establishing Multiple Objectives

The Foresee theoretical model developed in Chapter 1, as represented by Figure 1.8 in that chapter, serves as a guide to establishing lesson objectives in a variety of categories and subcategories. We reproduce that model here as Figure 5.1, with one addition: we have inserted a small inset circle to represent the Linguistic Knowledge subcomponent.

In ESL classes, where the emphasis is on **content-based language instruction**, the two base components in the diagram naturally receive the major share of attention. The content, represented by the circle at the apex of the large triangle, is viewed mainly as a vehicle for teaching academic language and learning strategies. The interaction here is primarily in a downwards direction, and is symbolized in our model by the arrows pointing from the content to the two lower components.

In regular subject-area classrooms, in contrast, the focus of instruction normally falls on the content component, with the two base components often receiving little or no attention. While the learning of regular curriculum content is certainly not unimportant to ESL students,

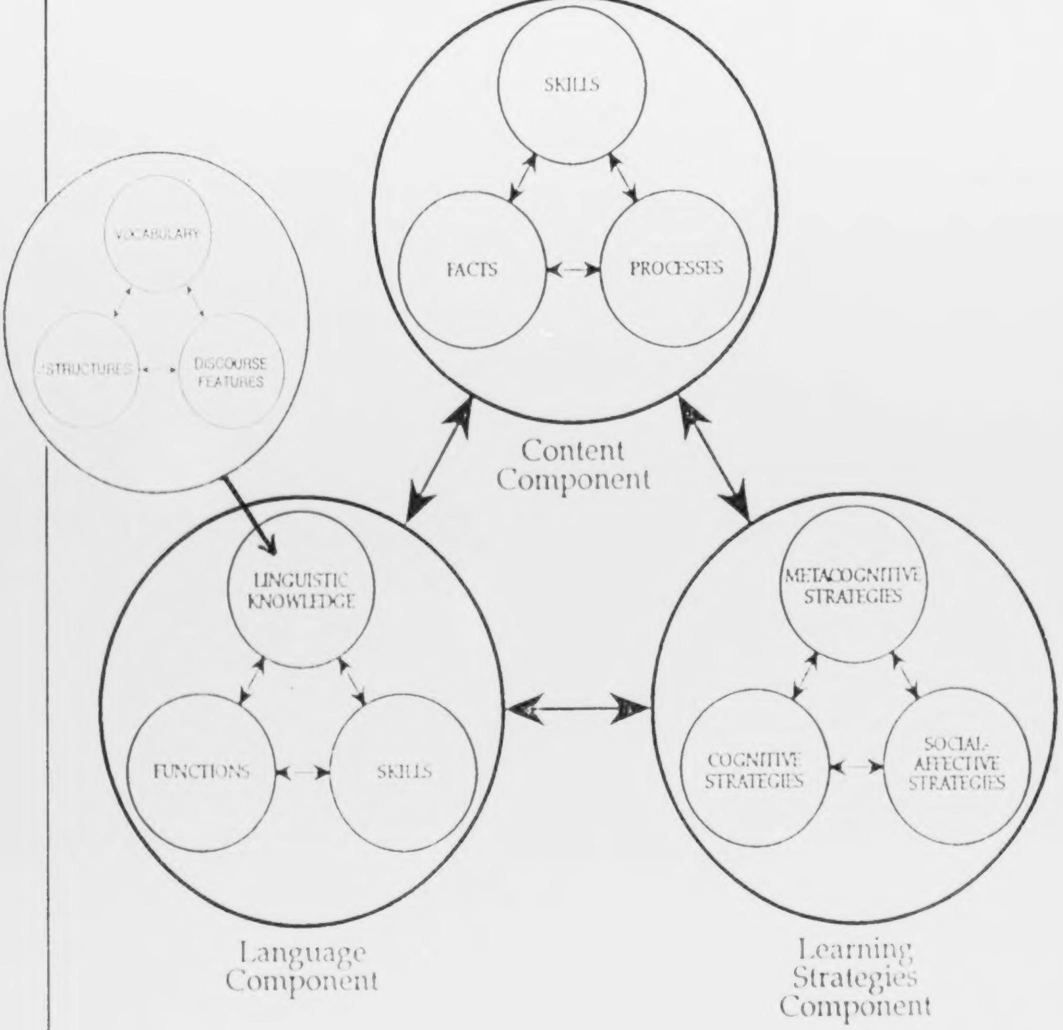

SKILLS
FACTS
PROCESSES
VOCABULARY
STRUCTURES
DISCOURSE FEATURES
Content Component
LINGUISTIC KNOWLEDGE
FUNCTIONS
SKILLS
METACOGNITIVE STRATEGIES
COGNITIVE STRATEGIES
SOCIAL-AFFECTIVE STRATEGIES
Language Component
Learning Strategies Component

Fig. 5.1: The Foresee Theoretical Model

we would argue that they need to learn much more than the facts, processes, and skills of the different subject areas to become capable, autonomous learners. Even more important to them are the development of academic language proficiency and skill at using effective learning strategies to comprehend and assimilate content-area material. Mainstream teachers must not, therefore, ignore the two base components. Although they are certainly justified in placing their main emphasis on the subject matter they are expected to teach, they should also make a conscious effort to include language and learning strategies objectives in their lessons. The result will be **language-sensitive content instruction**, an enriched recipe that better meets the needs of ESL students in regular classrooms.

There will inevitably be obstacles to the implementation of this kind of enriched instruction, of course. One will be a perceived lack of the class time that teachers might believe is necessary to teach so many things. Another will be the added effort that will be required of teachers in planning integrated lessons. These are problems that teachers will need to deal with, but we doubt that they will prove as serious as they may initially appear to be. Using Foresee-based techniques like those described later in this chapter, language-building and strategy-building activities can be included in content instruction without consuming a great deal of extra time or effort. We are confident that any teacher who takes the trouble to diversify his or her instructional objectives will find the venture worthwhile, as it will ultimately pay off in the form of enhanced comprehension and retention of the content material itself. Teaching ESL students academic language and learning strategies should not be viewed as a luxury, but rather as an effective route to helping them master the subject matter. This relationship is shown in Figure 5.1, where the interaction of major components is mainly upwards: instruction in the two base components will facilitate the learning of content.

Turning to the details, language and learning strategies objectives should be derived from these base components. They contain various subcomponents which can serve as a guide to establishing individual lesson objectives in a number of categories. Both of these components and their subcomponents were analyzed and discussed at length in Sections 3.3.2 and 3.3.3 of Chapter 1, and a short summary of the language component can be found in Chapter 3 (pp. 63-64). We refer the reader to those earlier parts of this manual for detailed information.

Those sections do not, of course, contain advice or suggestions about how these kinds of objectives can be realized through content work in the regular classroom. When Foresee is applied in its entirety, as in the sample lessons of Chapter 4, a great deal of attention is paid to the explanation and practice of language forms, functions, and skills (all of the subcomponents of the language component in Figure 5.1) and learning strategies. In fact, many Foresee techniques provide automatically for the instruction of specific language features and learning strategies. For example, the Dictated Instructions Technique (DIT) requires students to write sentences in the passive voice. The Text Questioning Technique (TQT) encourages the use of a wide range of learning strategies, including Advance organization, Predicting, Imagery, Selective attention, Organizational planning, Note taking, Self-monitoring, and Self-evaluation. But assuming that Foresee techniques like these cannot feasibly be implemented in their complete form in mainstream classrooms, how can subject-area teachers include such objectives in their regular instruction?

We admit that it will not be easy. Perhaps the main advantage of our Foresee lesson techniques is that they relieve teachers of the burden of devising original and inventive ways of incorporating these objectives into their lesson planning. But even if these techniques are not used, teachers should still be able to exploit the content material as a source of academic language forms and functions important in their disciplines. In fact, it is almost always possible to find a plethora of these in any reading passage, and teachers will normally have to pick and choose which ones they wish to emphasize. We give an example below, but before considering it, we offer a few basic suggestions for teaching language features.

(1) **Utilize subject-area texts (reading passages) as a source of examples of academic language.** In an effort to make the content more accessible to their students (whether English-speaking or ESL), many teachers habitually dispense with authentic reading texts as a primary source of information. Instead, they rely on notes of various kinds which they give to students as handouts or have the students copy from the overhead or chalkboard. Unfortunately, notes are usually lacking in many of the essential features of academic language that ESL students need to learn. For example, notes do not normally contain many of the discourse markers and linkers that abound in ordinary academic prose. On the structural level, articles are often omitted from notes, despite the fact that the proper use of articles is something all ESL students need to learn. Notes do not usually contain full sentences, so ESL students are deprived of examples of correct sentence forms. Verbs are often neglected in notes, since the major share of the information load can be carried by nouns and noun phrases; as a result, ESL students do not get the chance of observing the different verb tenses used in natural contexts. The list goes on and on, but we hope these examples make the point clear. If we want our ESL students to develop proficiency in comprehending and producing authentic academic language, we must expose them to as much academic language as possible. Notes have their place, certainly, and Foresee includes a number of innovative techniques for developing students' note taking skills. At the same time, however, Foresee takes advantage of real texts as an irreplaceable source

of *implicit* and — through the teacher's guidance — *explicit* information about language.

(2) **Provide explicit instruction about language features.** All aspects of the language component, especially what we have called "linguistic knowledge" (vocabulary, structures, and discourse features) and academic language functions, are amenable to direct, explicit instruction. In other words, teachers can explain these features to ESL students, making clear how they serve to express and communicate the content material. This should not be overdone, of course. For one thing, teachers would rarely have the time to explain *all* the language features that might occur in a selected passage, as we shall illustrate below. Nevertheless, it is almost always possible to select a few important structures, discourse features, or functions to analyze on an explicit level and raise to the students' consciousness, and over the course of a term or a year, this can add up to a great deal of language instruction which is unfortunately neglected when teachers focus exclusively upon content material. All mainstream teachers recognize the need to teach the vocabulary of their subject areas, of course, but there is no reason not to take advantage of the opportunity to teach other elements of language which are just as crucial to the development of overall academic competence.

(3) **Provide opportunities for the focused practice of language features.** The practice of academic language forms and functions should preferably be a natural, automatic outcome of participation in content-based class activities and the performance of tasks and assignments. In writing answers to questions, composing essays, or reporting science experiments, for example, students will need to utilize a range of vocabulary, structures, and discourse features, and they will have to accomplish certain targeted functions as well — describing, explaining, comparing and contrasting, expressing cause and effect, and so forth. At times, however, it may be worthwhile to devise more artificial assignments or worksheets that focus deliberately on the practice of selected structures or other language features. Although the present section is concerned with establishing lesson objectives, this is as good a place as any to offer a few examples of exercise types that are especially useful for the practice of

structures. Other examples can be found in later sections of this chapter, which deal specifically with procedures.

a) **Cloze exercises.** The teacher can choose a passage from a content-area textbook or other source, and then delete ("white-out") all the words of a certain type — verbs, articles, prepositions, pronouns, or whatever. Alternatively, a number of discourse markers can be omitted. By filling in the blank spaces, ESL students get the chance to practise the targeted feature in the context of authentic academic prose.

b) **Fill-in-the-blank exercises.** These may differ from cloze in several respects. They are often lists of numbered sentences rather than authentic texts, and the blanks may require entire phrases or even longer strings of language for completion.

c) **Rewriting (or transformation) exercises.** These can take a variety of forms, and are particularly useful for practising academic language functions. For example, definitions written in one sentence form may be converted (transformed) to an alternative form. Many microfunctions (see Chapter 1) offer possibilities for practice of this type.

(4) **Emphasize the teaching of academic language functions (ALFs).** A major part of developing academic language proficiency is becoming empowered to use language to accomplish the functions demanded of academic work ("ALFs," as we called them in chapter 1). As explained in Section 3.3.2.(2) of Chapter 1, students should learn three things about ALFs: the concepts underlying them (what they "mean"), the forms typically used to accomplish them, and their names. If ESL students can emerge from content-area courses knowing how to define terms, hypothesize, generalize, exemplify, compare and contrast, express cause and effect, classify, describe, explain, evaluate, etc., they will obviously be well on the road to academic success.

(5) **Emphasize the practice of all four language skills.** Every Foresee lesson provides opportunities for students to practise the four language skills: listening, speaking, reading, and writing. The sample lessons in Chapter 4 contain numerous ways of incorporating the practice of these skills into content-based instruction, and we will not attempt to recapitulate or summarize those procedures here. Speaking in general terms, we will simply say that if lessons are planned to include balanced portions of *teacher-directed* and *student-centred* activities, all four skills generally tend to be practised as a matter of course. We emphasize, however, that ESL students often

require a good deal of preparation and guidance in order to be able to apply these skills effectively. The five Foresee lesson techniques all contain specific devices for providing such guidance, and we suggest that subject-area teachers examine these carefully to get some general ideas for providing the necessary support.

So far in this section we have concentrated on the establishment of language objectives, more or less ignoring learning strategies. It is difficult to offer concrete advice about teaching these in the regular classroom. One reason for developing our Foresee lesson techniques was to provide ESL teachers with prefabricated schemes for including these strategies in their everyday instruction without making a great deal of conscious effort. We believe that if mainstream teachers examine our sample Foresee lessons and note carefully how these strategies are taught through them, both implicitly and explicitly, they will be able to devise their own ways of including some of these strategies in their instructional planning. The most important step in teaching learning strategies, we contend, is making the commitment to bother doing so. Some may be skeptical about these strategies. Are they really worth the trouble? For elementary-aged children, there is no question that they are, as these students are still learning how to learn. For secondary students, the answer is less unequivocal. Secondary ESL students with strong academic backgrounds in their own first languages are often quite proficient in using learning strategies that work for them. ESL students with weaker academic backgrounds can usually benefit from a certain amount of overt strategy instruction, however, and we recommend that teachers base their decisions about teaching learning strategies on the individual needs of their students. We also recommend that teachers keep this simple fact in mind: just because *they* know how to learn doesn't mean that *students* do.

We now present a single example of a short reading passage from a content-area textbook, with the aim of demonstrating how a variety of language features can be identified and perhaps selectively explained to ESL (and other) students. It is tempting to include a variety of passages from different subject areas, in hopes of showing how numerous and varied are the language forms and functions that occur in subject-area texts across the curriculum. One example should suffice to illustrate the general idea, however. For further examples, see some of the individual lessons of Chapter 4.

The passage we have selected, virtually at random, is a two-paragraph explanation of parthenogenesis taken from a senior 3 (grade 11) biology textbook, *Addison-Wesley Biology, SI Edition* (Kormondy & Essenfeld, 1984, 472).

Parthenogenesis

The development of an organism from an unfertilized egg is called **parthenogenesis** (PAR-thuh-nō-JEN-uh-sis). Although it is not common, parthenogenesis does happen in nature. In bees and wasps, for example, fertilized eggs develop into females; unfertilized eggs develop into males. Most organisms that are produced by parthenogenesis have the haploid number of chromosomes in their body cells. In earthworms, on the other hand, parthenogenesis occurs in specialized diploid cells.

In most species, parthenogenesis does not occur naturally. Scientists are able to induce parthenogenesis in the laboratory, however, using methods that imitate the action of a sperm entering an egg. Various chemicals, temperature shocks, and electric shocks cause the unfertilized egg to act as if it had been fertilized by a sperm. The egg begins to develop and eventually forms an offspring. Artificial parthenogenesis has been accomplished in sea urchins, frogs, hens, and rabbits.

ESL students might benefit from explicit instruction in, or practice of, the following language features (forms and functions) from this passage.

Linguistic Knowledge

Vocabulary

Verbs:	develop (into) induce imitate accomplish cause X to Y
Nouns:	development organism parthenogenesis haploid diploid chromosomes body cells species chemicals temperature shocks electric shocks egg sperm offspring

Organisms:	bees, wasps, earthworms, sea urchins, frogs, hens, rabbits
Adjectives:	fertilized, unfertilized (past participle forms) specialized (past participle form) various common artificial
Adverbs:	eventually

Structures

- Present tense - used to express general or scientific truths (e.g., "In bees and wasps ... fertilized eggs *develop* into females ...")
- Past perfect tense - used in an if-clause to express an unreal condition in the past ("as if it *had been fertilized*")
- Present perfect tense - used to express events that have occurred in a time frame that extends up to the present and could occur again in the future ("Artificial parthenogenesis *has been accomplished* in sea urchins, frogs, hens, and rabbits.")
- Passive voice - see the previous two examples. Also: "Most organisms that *are produced* by parthenogenesis ..."
- Participles used as adjectives - e.g., "an *unfertilized* egg" (past participle), "a sperm *entering* an egg" (present participle, used as head of a participial phrase)
- Infinitive forms
    - after the verb *cause* (following the pattern *cause X to Y*) - "cause the unfertilized egg *to act* ..."
    - after the verb *begin* - "The egg begins *to develop* ..."
- Emphatic *do* - "parthenogenesis *does* happen in nature." Used to counter the assertion that the phenomenon is rare ("not common")
- Periphrastic (multi-word) modal form *be able to* - used instead of the equivalent modal *can* in the sentence "Scientists *are able to* induce parthenogenesis ..."
- Cataphoric reference of pronouns (i.e., reference in a backward direction) - "Although *it* is not common, *parthenogenesis* does happen in nature."
- Articles
    - Introducing an item into the discourse using the indefinite article, then using the definite article to indicate prior reference. E.g.: "*an* egg" → "*the* unfertilized egg," "*the* egg"
    - Use of zero article with plural count nouns having indefinite reference, e.g., "in bees and wasps," "in earthworms"
- Adverbial clauses - of concession (*although it is not common*) and conditional, expressing unreal condition in the past (*as if it had been fertilized by a sperm*)
- Relative clauses - e.g., "most organisms *that are produced by parthenogenesis*"; "methods *that imitate the action of a sperm entering an egg*"

Discourse Features

- *for example*
- *on the other hand*
- *however*

Functions

- Defining - "The development of an organism from an unfertilized egg *is called* parthenogenesis."
- Exemplifying - "In bees and wasps, *for example, ...*"
- Contrasting
  - using a semicolon, e.g., "fertilized eggs develop into females; unfertilized eggs develop into males" (note that a marker indicating contrast, e.g. *whereas*, could be used just as easily here)
  - "In earthworms, *on the other hand, ...*"
- Generalizing - e.g.:
  - "Most organisms that are produced by parthenogenesis have the haploid number of chromosomes in their body cells."
  - "In most species, parthenogenesis does not occur naturally."

Almost any content-area passage will yield such a range of language forms and functions. The longer the passage, the more features will usually be included. This general approach to seeking out and identifying language aspects to be taught is, we admit, effective mainly for informationally heavy subjects like biology, general science, history, geography, and so on. More mathematics-based disciplines like mathematics itself, physics, and perhaps chemistry tend not to rely as much upon prose passages for the communication of concepts, so this procedure will not work as well with these subjects. Nevertheless, language can still be a stumbling block for ESL students studying these disciplines. For example, students often have difficulty understanding the meaning of math or physics word problems, so a good deal of language instruction is possible in these content areas as well. For a thorough discussion of this matter, consult Crandall (1987).

This completes our proposal to incorporate language objectives into regular subject-area lessons. We have dealt with learning strategies in only a cursory fashion, but we recommend that they also be taught through mainstream work whenever appropriate. Let us turn our attention now from objectives to procedures, that is, from the Foresee theoretical model to the Foresee application process.

3. General Procedures

In this section, we shall explore the possibility of subject-area teachers making use of the contents of the **procedures** component at the apex of the Foresee application triangle originally presented in Chapter 3 and repeated here as Figure 5.2. This component includes the five-stage lesson format and the various Foresee lesson techniques. Both of these levels of procedure have the potential for mainstream implementation, albeit with modifications in some cases. Following our discussion of these two somewhat general aspects of procedure, we shall suggest some specific activities that could be used to implement the Preparation stage in regular classrooms (Section 4) and some activities with the potential for mainstream application in the other four stages (Section 5).

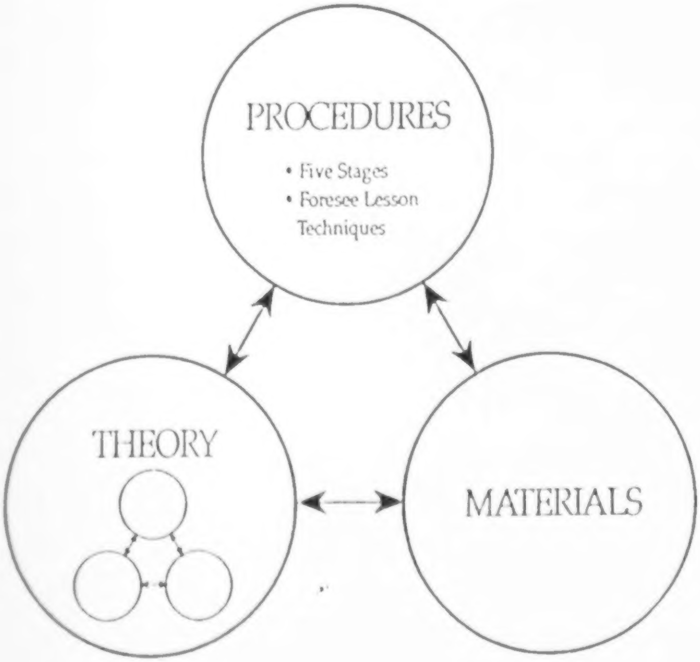


Fig. 5.2: The Foresee Application Process

Referring to the application model pictured in Figure 5.2, notice that we are not bothering to include a special section on the role of **materials** in mainstream Foresee instruction. The reason for this is that teachers will prefer to rely on the materials they have accumulated over the years rather than seek out or construct new materials that might be more suitable to Foresee application. This is understandable, and we are not proposing that teachers should make special efforts to discover or make new materials. We do recommend, however, that they pay some attention to the possibility of exploiting some of the specific materials they may already have (e.g., reading passages supported by good visuals) as the nuclei of Foresee-based lessons. If they do so, they will find it easier to implement (perhaps in modified form, as discussed below) Foresee lesson techniques like the TQT and the T-list Procedure.

3.1 The Five-Stage Format

As explained in Section 3.5 of Chapter 1 and again in Section 2.1 of Chapter 3, Foresee advocates a five-stage format of lesson organization. Although it would be unreasonable to expect mainstream teachers to follow this format consistently, ESL students in subject-area classes would likely benefit if an effort were made to include *some* of the stages *some* of the time. The five stages are as follows.

1. **Preparation.** In this stage, the teacher gets the students ready for the lesson topic by *activating prior knowledge* (e.g., by brainstorming, discussion, and — as elaborated below — through the use of visual representations). This is also the stage where essential *vocabulary*, so important to ESL students, should be introduced.

   One assumes that most skilled teachers follow the practice of opening each of their lessons with some kind of preparatory discussion or explanation intended to activate the students' background knowledge and relate it to the lesson topic. When ESL students are in the class, this introductory phase can and should be extended and elaborated for their benefit. See Section 4 below for some specific activities that might be included in the Preparation stage in mainstream classrooms.

2. **Presentation.** The teacher *presents* the new material (often a text or reading passage) in some way. One possibility, dictation, is an excellent procedure for helping ESL students to improve their listening comprehension skills.

   See Section 5 below for some specific activities that might be included in the Presentation stage in mainstream classrooms.

3. **Practice.** In this stage, the teacher has the students *participate in some activity*, preferably group-oriented and communicative, which will provide them with an opportunity to "actively manipulate both the concepts presented and the language skills needed to understand and express the new information" (Chamot & O'Malley, 1986). In the regular classroom, ESL students can work with English-speaking students to solve problems, perform experiments, and complete other tasks that will encourage communication and promote academic language development.

4. **Evaluation.** In each lesson, some kind of *informal evaluation* of ESL students' understanding and performance should be conducted (e.g., by the teacher, through self-evaluation, or as a cooperative peer activity). Formal tests should not be the only

occasion for assessing ESL students' progress! In regular subject-area classrooms, attention should be paid to the evaluation of ESL students' *linguistic* performance in addition to their performance with respect to the actual content work.

5. **Follow-up.** Here the teacher allows the students to *extend or consolidate their knowledge* of the new concepts and language by performing further activities. In Foresee, this is often the stage where students engage in explicit content-based *language* analysis, exercises, etc. Mainstream teachers can make a point of following up the subject-area work with specific content-based activities designed to promote **academic language development**.

3.2 Foresee Lesson Techniques

As explained in Chapter 3 and illustrated in Chapter 4, Foresee lesson techniques are specific procedures that teachers can follow as guides to constructing effective integrated lessons. At this point, five of these techniques have been formalized. We have argued in Section 1 of this chapter that these techniques are not fully suitable for implementation in mainstream classrooms, for a number of good reasons. Nevertheless, some of these techniques contain individual parts that could be useful in regular instruction. Also, most of them reflect generalized teaching procedures (basic approaches to getting the material across) that mainstream teachers might be able to adapt to their own purposes. See Chapter 3, Section 2.2, for detailed explanations of all these techniques.

1. **The Text Questioning Technique (TQT).** This is an intricate technique that requires considerable preparation, a fair amount of time, and a good deal of expertise for effective application *in its entirety*. Some of its individual *parts* could certainly be employed relatively easily by subject-area teachers, however. For example, the TQT Preparation stage has great potential value in any classroom containing ESL students; see Section 4 below. Another useful part might be the dictating of a passage with the expectation that the students take notes guided by a question list.
2. **The Research Technique.** The basic idea of this technique is that each student performs library research on a particular aspect of the main topic. These aspects or subtopics should all be of the same type, so that a list of common categories — what students should all discover about their individual subtopics — can be identified and preferably organized in the form of a chart or other graphic organizer. Each student's task is to complete his or her chart. In large mainstream classes, research could be conducted as a group activity.
3. **The Presentations Technique.** This is a sequel to the Research Technique. Once the students have completed their individual research, they give oral presentations on their findings to their classmates, who must listen carefully and record the information on a

master chart containing all the related subtopics. When the presentations are completed, every student will possess all the information about the main topic. Needless to say, both the Research and Presentations Techniques could be readily implemented by mainstream teachers in certain subject areas such as social studies, general science, and even language arts.

4. **The Dictated Instructions Technique (DIT).** The main feature of this technique is that instructions of various types (e.g., directions for performing a science experiment) are *dictated* to the students rather than being simply copied, given on a handout, or whatever. The dictation activity provides all students, ESL and English-speaking, with an opportunity to practise their listening and note taking skills. Following the dictation, students can work cooperatively in pairs or small groups to compare notes, pool information, and try to arrive at an accurate set of instructions which they can then use as the guide to performing the experiment. Following this, the students have to write the *method* section of the experiment report in the passive voice. There seems no reason why this technique could not be used in regular classrooms, in science and perhaps in other subject areas where ESL students are required to follow a set of directions to complete a task.

5. **The T-List Procedure.** The students draw a line down the centre of their notebook page in preparation for note taking. The teacher then dictates a passage, and the students must take notes by recording the main ideas in their left-hand column and the supporting ideas (details, examples, etc.) in the right-hand column. They can subsequently use these notes as the basis for paragraph or composition writing. This technique provides good practice in listening and note taking, and helps students develop the skills of attending to discourse markers and distinguishing between main and supporting ideas. Teachers can make the note taking task easier for ESL students by providing them with T-lists with some of the key information already filled in. As the course proceeds and the students gain more experience, the amount of informational support on these prepared T-lists can gradually be reduced until the students can perform the entire task on their own. The obvious advantage of this task is that it will work for virtually any content-area passage.

4. Suggested Activities for the Preparation Stage

The Preparation Stage should generally be regarded as the **visual stage**, in which the major concepts of the lesson are introduced or demonstrated to the students visually through the use of aids like the following:

- pictures
- collages (e.g., collections of pictures taken from books or magazines)
- charts

- tables
- graphs
- diagrams
- maps
- models or other realia

In this stage, the students can learn the key language elements, especially vocabulary, needed to describe and explain the visuals, first in their own words (through discussion) and then in the more technical language of the subject area, as contributed by the teacher. Following are some ideas for specific activities that could be included in the Preparation phase, either in ESL or in mainstream classrooms. Many of these suggestions are based on activities or exercises devised by Cleland and Evans (1984, 1987), whose "Topic Approach" to ESL teaching (Evans, 1986) resembles the Foresee Approach in a number of ways.

4.1 The Text Questioning Technique. The general principle of a "visual stage" is recognized in the Foresee Approach, especially in Foresee's **Text Questioning Technique (TQT)**. The Preparation stage of the TQT is devoted to predicting the contents of a reading passage and eliciting key vocabulary through brainstorming about visuals, captions, headings, subheadings, etc., accompanying the text. Important words are written on the board as they arise in the discussion. This sort of procedure could easily be followed in the regular classroom; all that is required is a suitable text accompanied by visuals of some kind (pictures, diagrams, realia, or whatever). Note that the text itself is not to be read during this preparatory phase.

This phase of the TQT is very **teacher-directed**. It is the teacher who controls the discussion and asks pointed questions to elicit the desired vocabulary. In the other preparation activities below, the analysis and manipulation of the visuals tends to be more **student-centred.** Teachers should bear in mind, however, that a good deal of preparation and direction may be necessary prior to the point at which the students become involved with these tasks. It would be a mistake to expect ESL students to perform these activities without prior instruction and guidance, often extensive.

4.2 Manipulating Picture Cards. This is a good language-building activity to involve students in discussing **cycles** or **sequences**. The teacher can cut out pictures of the various stages involved, and then glue these onto cards. As an example, consider the life cycle of a frog, a biology topic. It is easy to find suitable diagrams of this cycle, accompanied by labels of the various parts of the developing organism, in biology textbooks or other reference sources. The teacher should remove (white-out) the labels on the cards given to the students. One possible version of the activity proceeds as follows; many variants are possible.

a) The students (in groups) can manipulate the cards to form a circle, the life cycle of the frog. Discussion is **informal** at this stage; the students use their own words in discussing the various features that seem important to determining the order. After monitoring by the teacher, groups can glue their cycles onto large cardboard sheets.

b) The sheets are turned over. The teacher then discusses the vocabulary necessary to describe the different stages of the cycle, labeling a transparency version with these terms. The students copy the words onto small cards, and the overhead is turned off. The students then turn their cycles face-up, and use the small cards to label their diagram. If they have placed these correctly, they glue them on.

Subsequent phases of the lesson could focus on (a) the academic language function of **describing** the changes from stage to stage of the frog's life cycle, (b) verbs suitable for describing the changes (e.g., *consists of, develops into, forms*), (c) writing individual sentences to describe the changes, and then (d) sequencing these into a paragraph using suitable discourse markers. (Notice the progression in language use: informal discussion → elaboration of language → formal writing). Other examples of topics lending themselves to this activity are:

- the life cycle of a flowering plant or other type of plant (biology)
- life cycles of various insects (biology)
- the water cycle, carbon cycle, and nitrogen cycle (biology/geography)
- agricultural stages (e.g., rice growing, shown in a series of pictures) — a sequence, not a cycle (geography)
- stages of industrial production, e.g., steel production (geography)

4.3 **Interpreting Charts, Graphs, Maps, Time Lines, etc.** Visual aids of this type can often be used as the basis for interpretive questions that the students can answer without a great deal of prior coaching or preparation. In studying a particular region in geography, for example, the students could be given a climatic chart listing the average temperature and amount of precipitation for each month of the year. They use this chart as the basis for the following sequence of activities.

a) First, they construct a **graph** picturing the average temperature and average precipitation for each month of the year. This can be done on one graph, with the 12 months listed along the horizontal axis. The temperatures can be indicated by a line graph and the monthly precipitation by a bar graph.

b) The students then use their graphs to complete a **true-false** activity of the following type. Working in pairs or groups, they identify the true (correct) statements in a set of sentences the teacher puts on the board (or overhead). They write these on individual cards, ignoring the false statements entirely.

c) To understand this next step, it is essential to know where the true-false statements came from. They are the individual sentences of a well-written paragraph summarizing the climatic conditions in the region, with certain necessary changes made, such as the replacement of pronouns by nouns, the omission of logical connectives (discourse linkers), and the breaking up of compound and complex sentences into simple sentences. A few false statements are added to make the exercise in (b) a workable one. Now the students have to take their cards, which should contain only the sentences from the original paragraph, and sequence them in what they think is an appropriate order. This gives them practice in identifying statements which are topic sentences, elaborations, examples, or conclusions.

d) After they have sequenced the sentences to their satisfaction, they are asked to carry out certain tasks (prescribed on worksheets) which weld the sentences into a well-structured discourse. These tasks include sentence combining, substituting pronouns for nouns, and adding logical connectives (discourse markers).

e) Finally, they write out their composition, which they may later compare with a reading passage on the same topic.

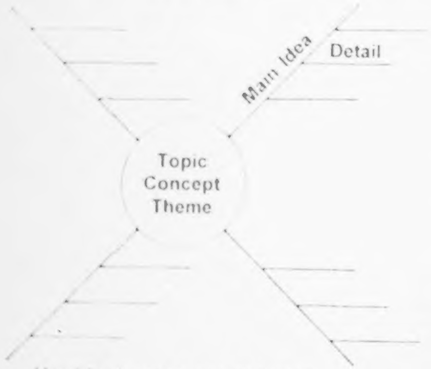
4.4 **Placing Cards on Graphic Representations.** Following a vocabulary brainstorming session based on suitable visuals, students are given a set of cards containing many of the terms discussed. They are asked to organize these cards into a graphic representation of some type, as specified by the teacher. Examples of some useful graphic formats can be found in a short article entitled "Teaching students to construct graphic representations" (Jones *et al.*, 1989). A number of these are shown in Figure 5.3, accompanied by suggestions for application to topics in different subject areas.

4.5 **Vocabulary Grouping (or Classifying).** Following a vocabulary discussion session based on the examination of some visuals, the students can be asked to group the new words into categories (either specified by the teacher, or decided by the students themselves). This activity has two purposes:

a) It helps students review the vocabulary.
b) Since categorization involves active working with the words, the activity makes the words easier to understand and remember.

As an extension, the students may complete a set of sentences based on the visuals, filling in blanks with words from their lists.

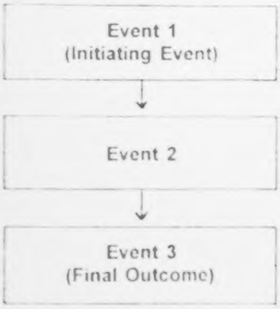
Spider Map



Used to describe a central idea

- a thing (e.g., a geographic region)
- a process (e.g., meiosis)
- a concept (e.g., altruism)
- a proposition (e.g., euthanasia should be legalized)

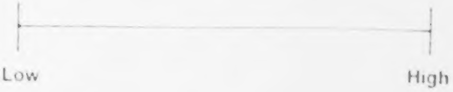
Series of Events Chain



Used to describe

- the stages of something (e.g., the life cycle of a primate)
- the steps in a linear procedure (e.g., how to neutralize an acid)
- a sequence of events (e.g., how feudalism led to the formation of nation states)
- the goals, actions, and outcomes of a historical figure or fictional character

Continuum/Scale



Used for

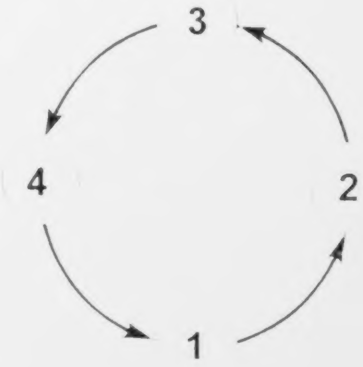
- time lines showing historical events
- degrees of something (e.g., weight)
- ratings scales

Compare/Contrast Matrix

	Item 1	Item 2
Attribute 1		
Attribute 2		
Attribute 3		

Used to show similarities and differences between two or more things (people, places, events, entities, or ideas)

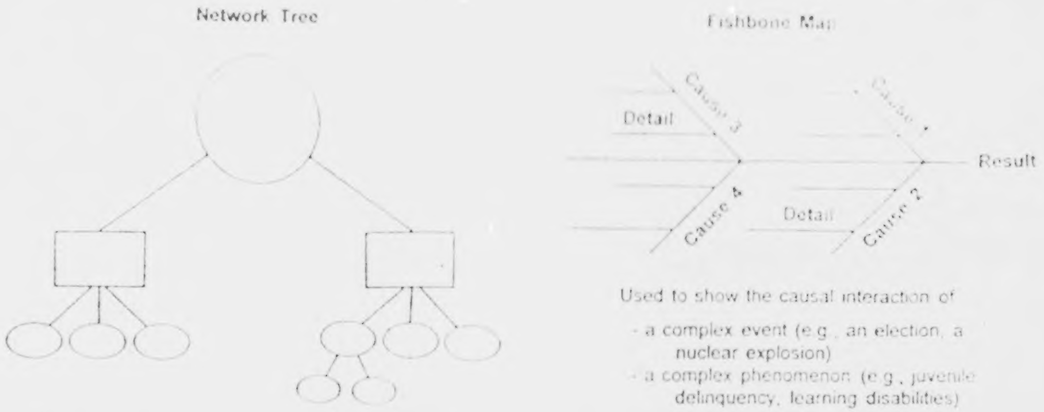
Cycle



Used to show how a series of events interact to produce the same results over and over. E.g.

- weather phenomena
- life cycles of organisms

Fig. 5.3: Useful Graphic Representations



Used to show the causal interaction of:

- a complex event (e.g., an election, a nuclear explosion)
- a complex phenomenon (e.g., juvenile delinquency, learning disabilities)

Used to show:

- causal information (e.g., causes of poverty)
- a hierarchy (e.g., types of insects)
- branching procedures (e.g., the circulatory system)

Text is adapted with permission from B.F. Jones, J. Pierce, and B. Hunter. "Teaching Students to Construct Graphic Representations." *Educational Leadership*, 46, 4: 20-21, 24-25. Illustrations are adapted with permission from North Central Regional Educational Laboratory, Oak Brook, IL: 22-23.

Fig. 5.3 Continued

5. Suggested Activities for the Other Four Stages

5.1 **Dictation.** In Foresee, the Presentation phase is the stage where a **text** or **reading passage** is often introduced in some way. In three of the standardized Foresee techniques, namely the TQT, the DIT, and the T-List Procedure (see Section 3.2 above), this presentation is accomplished through **dictation**. Mainstream teachers could easily use this procedure to advantage.

5.2 **True-False Statements.** These can be used in the Practice phase. They differ from those in the Preparation stage, as their assessment demands a deeper knowledge of the text.

5.3 **Substitution.** This type of exercise requires students to understand and explain the antecedents of certain pronouns, relative pronouns, and demonstrative pronouns or adjectives in the reading passage. They are asked to rewrite parts of a text, substituting full words or phrases for the pronouns given in bold print.

5.4 Alternatives. This exercise gives practice in using words or expressions of similar meaning to express the given ideas. Usually the students have to rewrite a series of sentences, substituting words or expressions in bold print by words or expressions of similar meaning found in the reading passage.

5.5 Academic Language Functions. The reading passage can be used as the basis for exercises in accomplishing a variety of academic language functions such as:

- writing definitions
- describing events in sequence
- expressing comparison and contrast
- classifying
- explaining causes and results
- exemplifying
- generalizing
- expressing opinions

E.g.: **Causes and results.** (Note: The following exercise is based on a reading passage about the water cycle in Lesson 3 of Chapter 4. We present the exercise in a different form from the one found in that chapter.)

Join phrases from list A to those from List C in the table below, using the appropriate joining words to form correct sentences. Base your decisions on the information in the reading passage. Rewrite all sentences you make, being sure to include correct capitalization and punctuation.

List A	Joining words	List C
the sun heats the surface of the water	causing as a result resulting in	it changes back to a liquid
the water vapor cools		the formation of larger droplets
sometimes many droplets collect in the same place		some of the water to rise into the air
water droplets begin to stick together		them to fall from the sky as precipitation
the larger water droplets become heavy		clouds form
Etc.		Etc.

6. Conclusion

Many of the ideas suggested in the latter part of this chapter represent work in progress, not a finished product. Ours is a constantly evolving approach, and the long-range goal of the ongoing inquiry introduced here is to expand the Foresee repertoire of practical procedures so that our approach will be fully applicable at all levels and in any instructional context, including the secondary subject-area classroom. We welcome suggestions and ideas from any teacher, ESL or mainstream, elementary or secondary, who has devised original ways of implementing Foresee in the classroom.

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